

# pH\_HOBO\_plots 1.1

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Trim individual files to time deployed and retrieved, then compile and visualize the data.

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## 0.1 Set up workspace

### 0.1.1 Dennis

```
setwd(wdDen)
filenames <- dir()
filenames

[1] "1230_East_Dennis 2022-08-05 16_12_44 EDT (Data EDT).csv"
[2] "1230_East_Dennis 2022-08-05 16_12_44 EDT (Data EDT).csv.orig"
[3] "1230_East_Dennis 2022-09-21 09_29_48 EDT (Data EDT).csv"
[4] "1230_East_Dennis 2022-09-21 09_29_48 EDT (Data EDT).csv.orig"
[5] "Den_077 2022-09-14 14_08_26 EDT (Data EDT).csv"
```

```

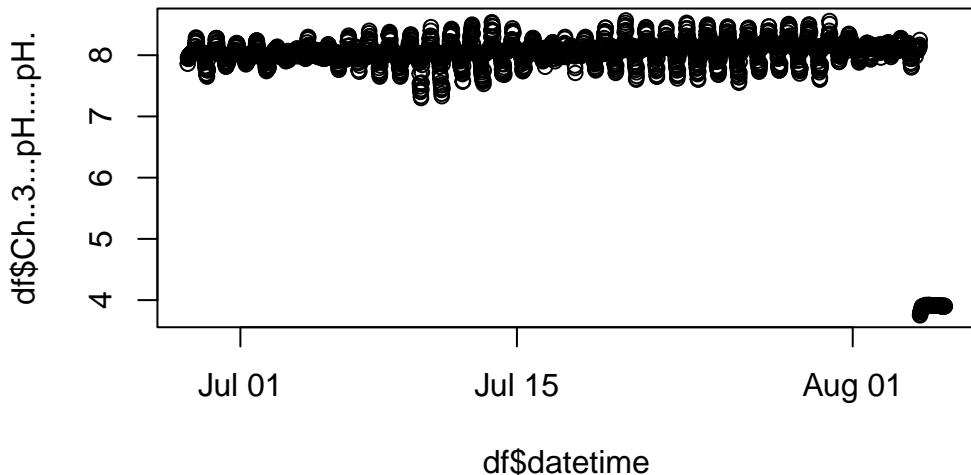
[6] "Den_077 2022-09-14 14_08_26 EDT (Data EDT).csv.orig"
[7] "Den_077 2022-09-21 09_28_37 EDT (Data EDT)(1).csv"
[8] "Den_077 2022-09-21 09_28_37 EDT (Data EDT)(1).csv.orig"
[9] "E Dennis 2022-06-13 08_04_00 EDT (Data EDT).csv"
[10] "E Dennis 2022-06-13 08_04_00 EDT (Data EDT).csv.orig"
[11] "Untitled.ipynb"
[12] "Untitled.ipynb.orig"

```

```

setwd(wdDen)
# Late June to early Aug
#(open_file <- filenames[1]) # "1230_East_Dennis 2022-08-05 16_12_44 EDT (Data EDT).csv"
open_file <- "1230_East_Dennis 2022-08-05 16_12_44 EDT (Data EDT).csv"
#Also works: (open_file <- filenames[2]) # "1230_East_Dennis 2022-09-21 09_29_48 EDT (Data
df <- read.csv(open_file, stringsAsFactors = F)
df$datetime <- as.POSIXct(strptime(df$date..EDT., format = "%m/%d/%Y %H:%M:%S"))
plot(df$datetime, df$Ch..3...pH....pH.)

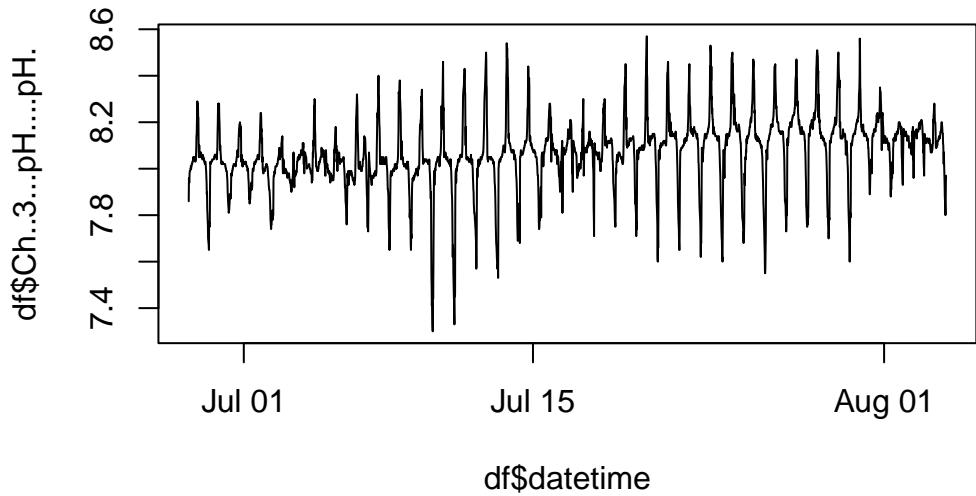
```



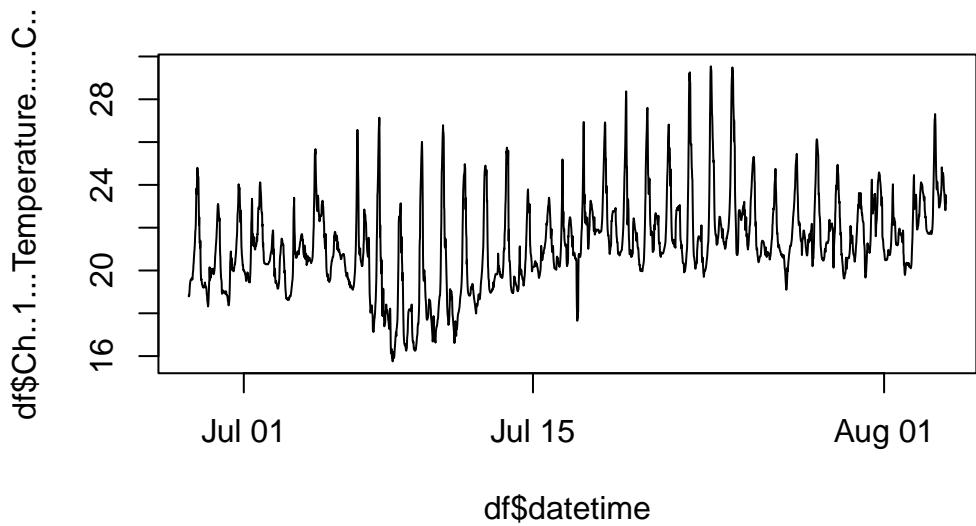
```

df <- df[df$datetime<"2022-08-04 00:08:00 EDT",]
plot(df$datetime, df$Ch..3...pH....pH., type = "l")

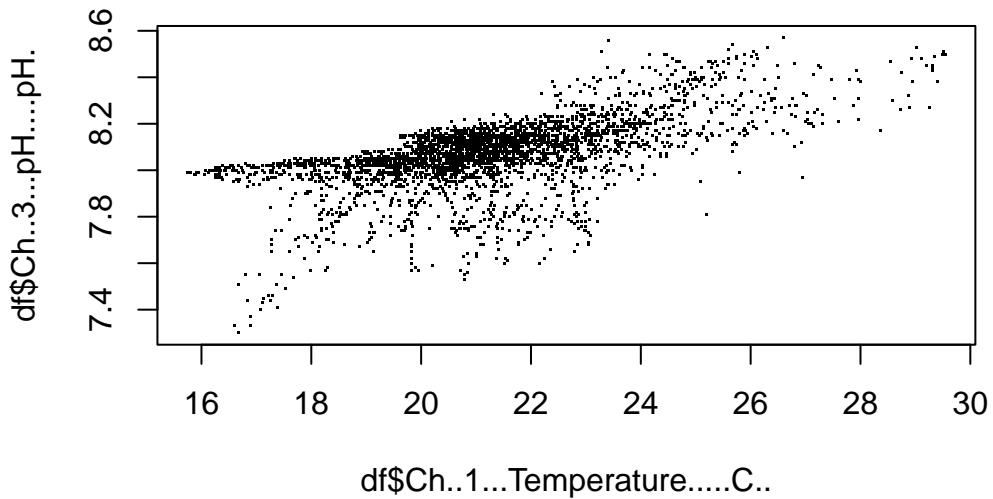
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "l")
```



```
plot(df$Ch..1...Temperature.....C., df$Ch..3...pH....pH., pch = '.')
```



```
#Metadata
SN <- 230
tris <- 8.34
tris_temp <- 24.05

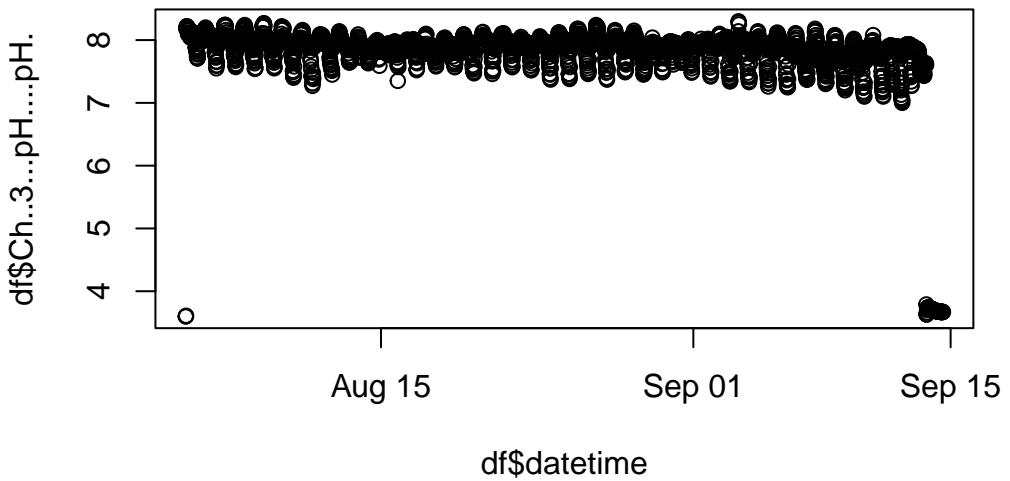
data_combined_new <- data.frame(
  Site = rep("Den",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature.....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)
data_combined <- rbind(data_combined_new)
```

```

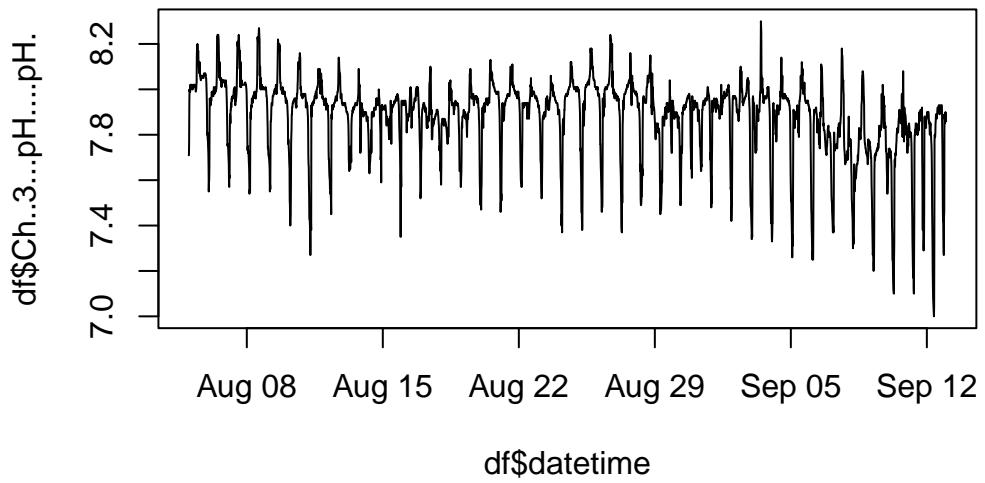
# setwd(wdDen)
# # Late June to early Aug
# #(open_file <- filenames[1]) # "1230_East_Dennis 2022-08-05 16_12_44 EDT (Data EDT).csv"
# open_file <- "1230_East_Dennis 2022-08-05 16_12_44 EDT (Data EDT).csv"
# #Also works: (open_file <- filenames[2]) # "1230_East_Dennis 2022-09-21 09_29_48 EDT (Da
# df <- read.csv(open_file, stringsAsFactors = F)
# df$datetime <- as.POSIXct(strptime(df$date..EDT., format = "%m/%d/%Y %H:%M:%S"))
# plot(df$datetime, df$Ch..3...pH....pH.)
# df <- df[df$datetime<"2022-08-04 00:00:00 EDT",]
# plot(df$datetime, df$Ch..3...pH....pH., type = "l")
# plot(df$datetime, df$Ch..1...Temperature.....C.., type = "l")
# plot(df$Ch..1...Temperature.....C.., df$Ch..3...pH....pH., pch = '.')
#
# #Metadata
# SN <- 230
# tris <- 8.34
# tris_temp <- 24.05
#
# data_combined_new <- data.frame(
#   Site = rep("Den",times = nrow(df)),
#   Date = df$datetime,
#   Temp = df$Ch..1...Temperature.....C..,
#   pH = df$Ch..3...pH....pH.,
#   Tris = rep(tris,length(df$datetime)),
#   Tris_temp = rep(tris_temp,length(df$datetime)),
#   Serial_number = rep(SN,length(df$datetime))
# )
#
# data_combined <- rbind(data_combined_new)

setwd(wdDen)
# Aug to mid September
#"Den_077 2022-09-14 14_08_26 EDT (Data EDT).csv"
#"Den_077 2022-09-21 09_28_37 EDT (Data EDT)(1).csv" is the same file read out later on
#(open_file <- filenames[3])
open_file <- "Den_077 2022-09-14 14_08_26 EDT (Data EDT).csv"
df <- read.csv(open_file, stringsAsFactors = F)
df$datetime <- as.POSIXct(strptime(df$date..EDT., format = "%m/%d/%Y %H:%M:%S"))
plot(df$datetime, df$Ch..3...pH....pH.)

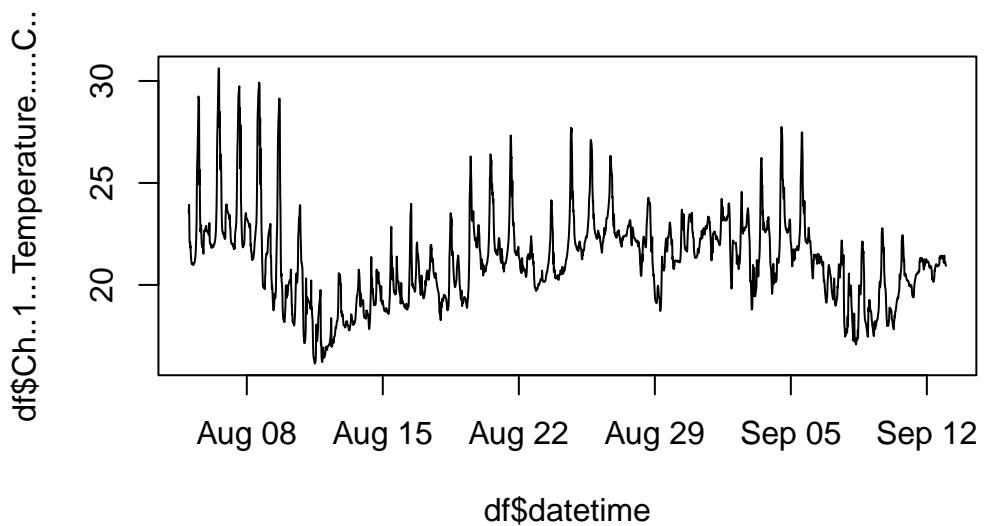
```



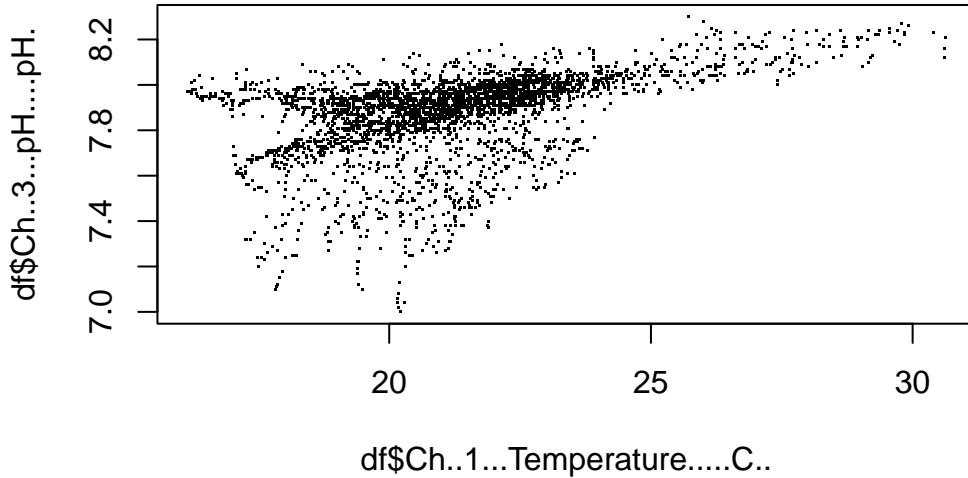
```
df <- df[df$datetime>"2022-08-05 00:00:00 EDT",]  
df <- df[df$datetime<"2022-09-13 00:00:00 EDT",]  
plot(df$datetime, df$Ch..3...pH....pH., type = "l")
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "l")
```



```
plot(df$Ch..1...Temperature.....C., df$Ch..3...pH....pH., pch = '.')
```



```
#Metadata
SN <- 077
tris <- 8.16
tris_temp <- 23.98

data_combined_new <- data.frame(
  Site = rep("Den",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature.....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)

head(data_combined_new)
```

	Site	Date	Temp	pH	Tris	Tris_temp	Serial_number
1	Den	2022-08-05 00:15:00	23.54	7.71	8.16	23.98	77
2	Den	2022-08-05 00:30:00	23.79	7.71	8.16	23.98	77
3	Den	2022-08-05 00:45:00	23.93	7.77	8.16	23.98	77
4	Den	2022-08-05 01:00:00	23.04	7.94	8.16	23.98	77
5	Den	2022-08-05 01:15:00	22.15	8.00	8.16	23.98	77
6	Den	2022-08-05 01:30:00	22.06	7.99	8.16	23.98	77

```
tail(data_combined_new)
```

	Site	Date	Temp	pH	Tris	Tris_temp	Serial_number
3738	Den	2022-09-12 22:30:00	21.10	7.85	8.16	23.98	77
3739	Den	2022-09-12 22:45:00	21.13	7.87	8.16	23.98	77
3740	Den	2022-09-12 23:00:00	21.01	7.90	8.16	23.98	77
3741	Den	2022-09-12 23:15:00	20.98	7.89	8.16	23.98	77
3742	Den	2022-09-12 23:30:00	20.96	7.87	8.16	23.98	77
3743	Den	2022-09-12 23:45:00	20.94	7.86	8.16	23.98	77

### 0.1.2 Ptown

```
setwd(wdPtown)
filenames <- dir()
filenames

[1] "20573560_Ptown 2022-06-15 18_08_38 EDT (Data EDT).csv"
[2] "20573560_Ptown 2022-06-15 18_08_38 EDT (Data EDT).csv.orig"
[3] "20573560_Ptown 2022-08-05 17_08_58 EDT (Data EDT).csv"
[4] "20573560_Ptown 2022-08-05 17_08_58 EDT (Data EDT).csv.orig"
[5] "20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv"
[6] "20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv.orig"
[7] "20573560_Ptown 2022-11-02 15_02_10 EDT (Data EDT).csv"
[8] "20573560_Ptown 2023-05-10 14_13_07 EDT (Data EDT).csv"
[9] "20573560_Ptown 2023-05-10 14_13_07 EDT (Data EDT).csv.orig"
[10] "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv"
[11] "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv.orig"
[12] "340_Ptown 2023-06-11 14_35_41 EDT (Data EDT)(1).csv"
[13] "Ptown 2022-05-17 14_31_47 EDT (Data EDT) 2.csv"
[14] "Ptown 2022-05-17 14_31_47 EDT (Data EDT) 2.csv.orig"
[15] "Ptown 2022-05-17 14_31_47 EDT (Data EDT).csv"
[16] "Ptown 2022-05-17 14_31_47 EDT (Data EDT).csv.orig"
```

```
[17] "Ptown 2022-06-27 15_06_47 EDT (Data EDT).csv"
[18] "Ptown 2022-06-27 15_06_47 EDT (Data EDT).csv.orig"
[19] "Ptown_075 2022-08-29 21_52_54 EDT (Data EDT).csv"
[20] "Ptown_075 2022-08-29 21_52_54 EDT (Data EDT).csv.orig"
[21] "Ptown_076 2022-12-05 21_20_00 EST (Data EST).csv"
[22] "Ptown_076 2022-12-05 21_20_00 EST (Data EST).csv.orig"
[23] "Ptown_20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv"
[24] "Ptown_20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv.orig"
```

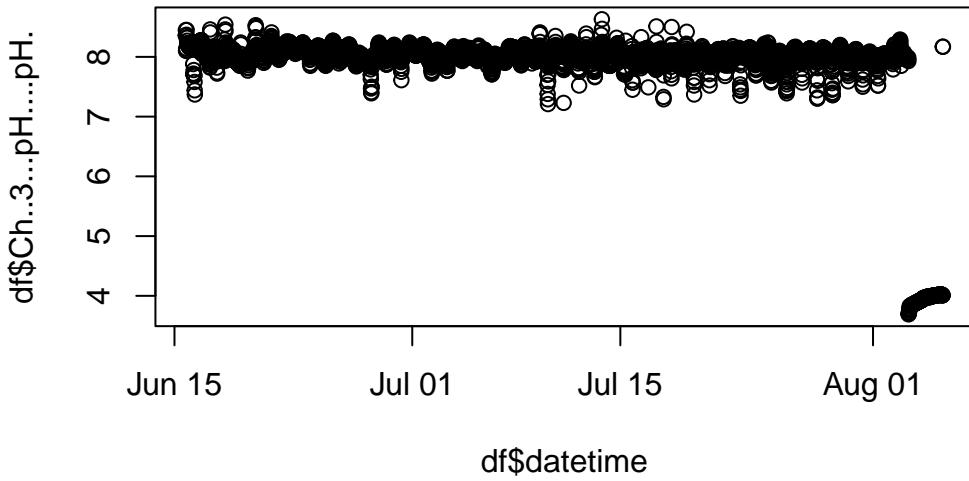
```
setwd(wdPtown)
# mid June to August
open_file <- "20573560_Ptown 2022-08-05 17_08_58 EDT (Data EDT).csv"
df <- read.csv(open_file, stringsAsFactors = F)
head(df)
```

X.	Date.Time..EDT.	Ch..1...Temperature.....C..	Ch..2...Millivolts....mv.
1	06/15/2022 18:09:46	20.91	-84.85
2	06/15/2022 18:24:46	20.25	-89.80
3	06/15/2022 18:39:46	19.46	-70.27
4	06/15/2022 18:54:46	19.22	-72.31
5	06/15/2022 19:09:46	19.25	-71.35
6	06/15/2022 19:24:46	19.48	-85.28

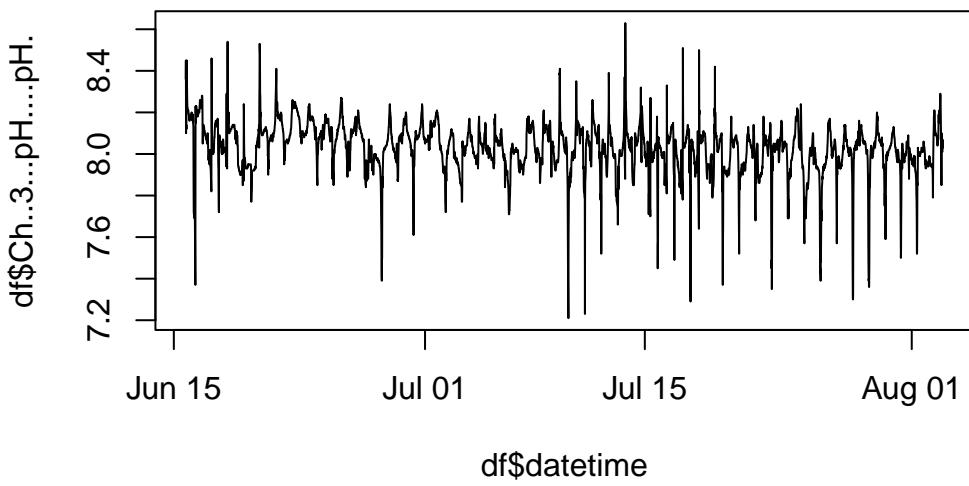
  

	Ch..3...pH....pH.	Button.Down	Button.Up	Host.Connected	End.of.File
1	8.36				
2	8.45				
3	8.10				
4	8.14				
5	8.12				
6	8.37				

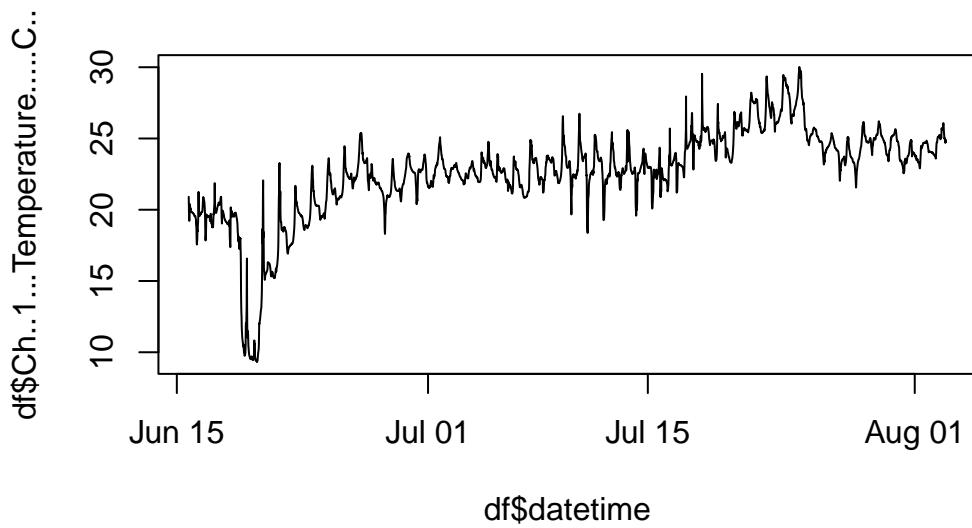
```
df$datetime <- as.POSIXct(strptime(df$date..EDT., format = "%m/%d/%Y %H:%M:%S"))
plot(df$datetime, df$Ch..3...pH....pH.)
```



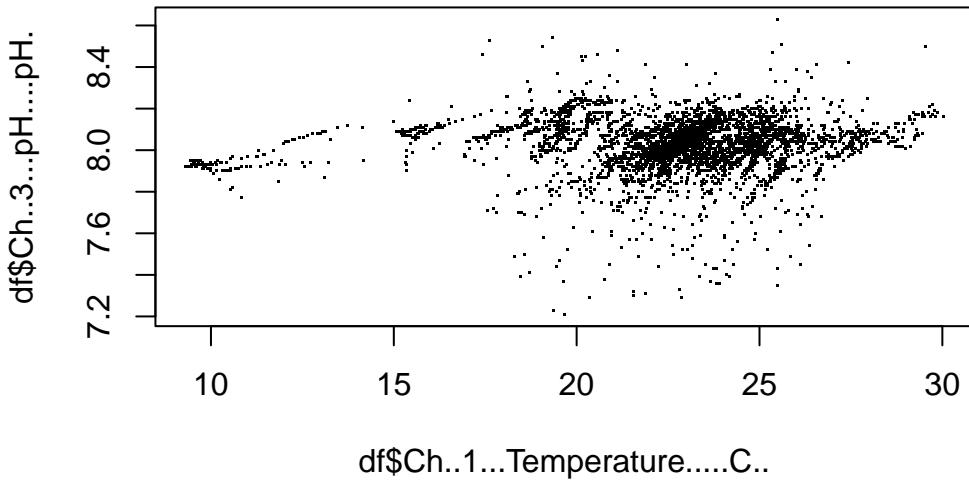
```
df <- df[df$datetime<"2022-08-03 00:08:00 EDT",]  
plot(df$datetime, df$Ch..3...pH....pH., type = "l")
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "l")
```



```
plot(df$Ch..1...Temperature.....C., df$Ch..3...pH....pH., pch = '.')
```



```

#Metadata
SN <- 560
tris <- 8.17
tris_temp <- 24.15

data_combined_new <- data.frame(
  Site = rep("Ptown",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)

setwd(wdPtown)
# August
(open_file <- filenames[6])

```

```
[1] "20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv.orig"
```

```
open_file <- "Ptown_075 2022-08-29 21_52_54 EDT (Data EDT).csv"
df <- read.csv(open_file, stringsAsFactors = F)
head(df)
```

X.	Date.Time..EDT.	Ch..1...Temperature.....C..	Ch..2...Millivolts....mv.
1	08/02/2022 21:25:37	NA	NA
2	08/03/2022 08:00:00	23.04	175.90
3	08/03/2022 08:15:00	23.59	175.96
4	08/03/2022 08:30:00	23.98	176.02
5	08/03/2022 08:45:00	25.91	176.32
6	08/03/2022 09:00:00	25.48	-91.85

	Ch..3...pH....pH.	Host.Connected	Button.Down	Button.Up	End.of.File
1	NA	Logged			
2	3.56				
3	3.56				
4	3.57				
5	3.58				
6	8.28				

```
tail(df)
```

X.	Date.Time..EDT.	Ch..1...Temperature.....C..
2552	2552 08/29/2022 21:30:00	24.22
2553	2553 08/29/2022 21:45:00	24.29
2554	2554 08/29/2022 21:46:15	NA
2555	2555 08/29/2022 21:46:17	NA
2556	2556 08/29/2022 21:51:50	NA
2557	2557 08/29/2022 21:51:51	NA

	Ch..2...Millivolts....mv.	Ch..3...pH....pH.	Host.Connected	Button.Down
2552	156.68	3.91		
2553	156.66	3.91		
2554	NA	NA		Logged
2555	NA	NA	Logged	
2556	NA	NA		Logged
2557	NA	NA	Logged	

	Button.Up	End.of.File
2552		
2553		

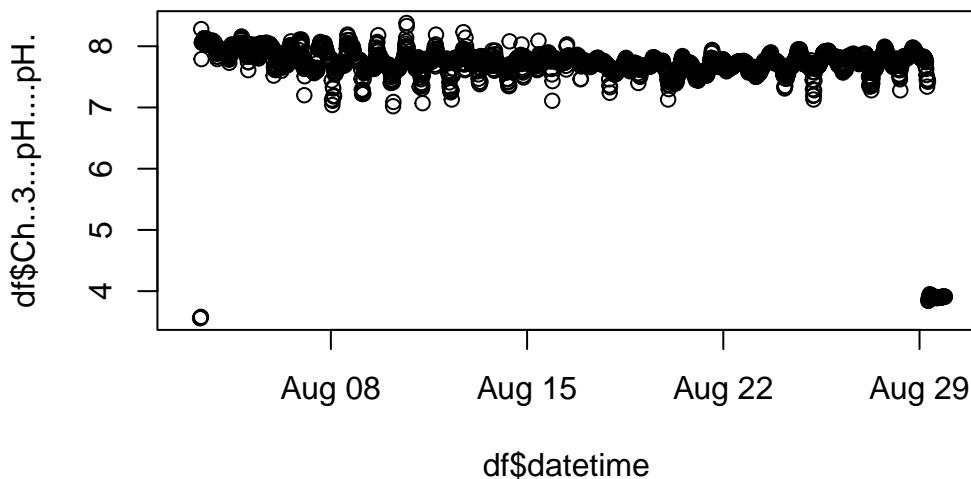
```
2554     Logged
```

```
2555
```

```
2556     Logged
```

```
2557             Logged
```

```
df$datetime <- as.POSIXct(strptime(df>Date.Time..EDT., format = "%m/%d/%Y %H:%M:%S"))
plot(df$datetime, df$Ch..3...pH....pH.)
```



```
df <- df[df$datetime>"2022-08-04 00:00:00 EDT",]
df <- df[df$datetime<"2022-08-29 00:00:00 EDT",]
#plot(df$datetime, df$Ch..3...pH....pH., type = "l")
#plot(df$datetime, df$Ch..1...Temperature.....C..., type = "l")
#plot(df$Ch..1...Temperature.....C..., df$Ch..3...pH....pH., pch = '.')
#Metadata
SN <- 075
tris <- 8.14
tris_temp <- 25.11

data_combined_new <- data.frame(
  Site = rep("Ptown",times = nrow(df)),
```

```

Date = df$datetime,
Temp = df$Ch..1...Temperature.....C.,
pH = df$Ch..3...pH....pH.,
Tris = rep(tris,length(df$datetime)),
Tris_temp = rep(tris_temp,length(df$datetime)),
Serial_number = rep(SN,length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)

```

SN560 8/28/22

Tris 8.20pH, 24.73C

```

setwd(wdPtown)
# September
# Also is here: "20573560_Ptown 2022-11-02 15_02_10 EDT (Data EDT).csv"
open_file <- "Ptown_20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv"
df <- read.csv(open_file, stringsAsFactors = F)
head(df)

```

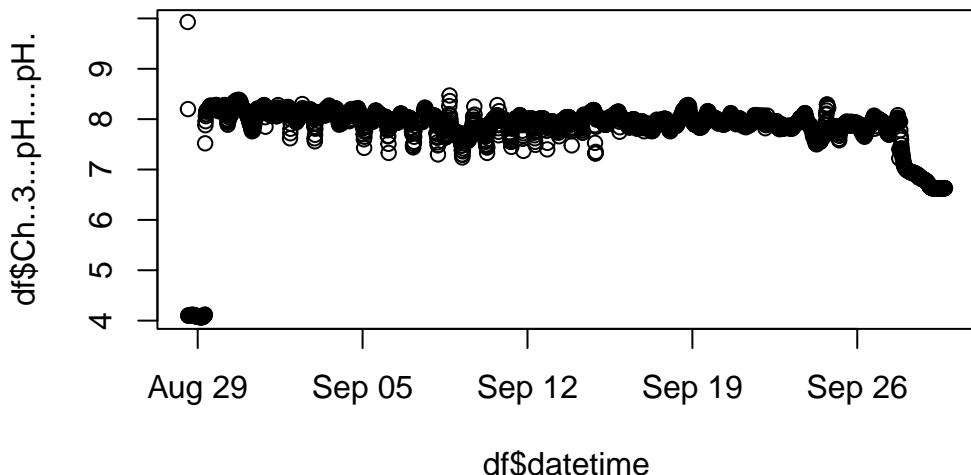
	X.	Date.Time..EDT.	Ch..1...Temperature.....C..	Ch..2...Millivolts....mv.
1	1	08/28/2022 13:50:27	24.65	-181.07
2	2	08/28/2022 14:04:17	NA	NA
3	3	08/28/2022 14:04:18	NA	NA
4	4	08/28/2022 14:05:27	24.68	-82.24
5	5	08/28/2022 14:11:28	NA	NA
6	6	08/28/2022 14:11:29	NA	NA
		Ch..3...pH....pH.	Button.Down Host.Connected Button.Up End.of.File	
1		9.93		
2		NA	Logged	
3		NA		Logged
4		8.20		
5		NA	Logged	
6		NA		Logged

```
tail(df)
```

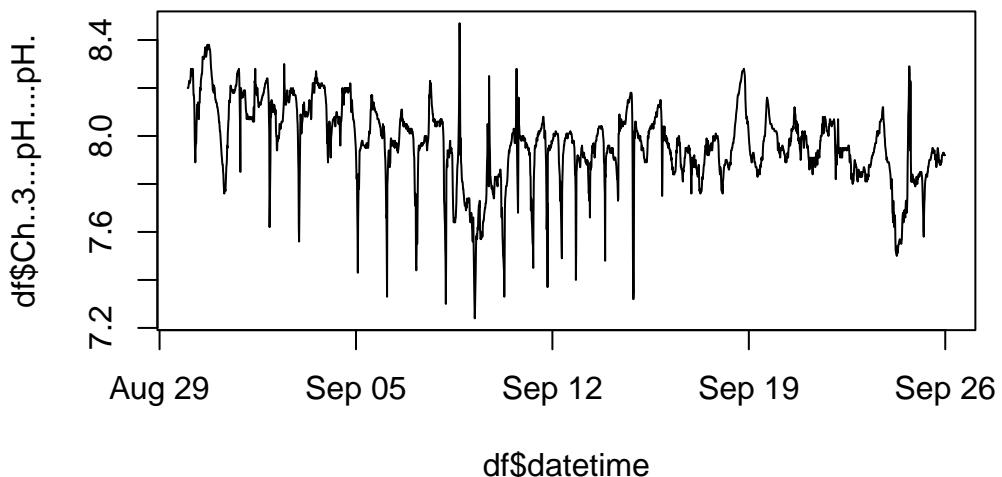
X.	Date.Time..EDT.	Ch..1...Temperature.....C..
3092	3092 09/29/2022 16:50:27	24.94

3093	3093	09/29/2022	17:05:27		24.87
3094	3094	09/29/2022	17:20:27		24.63
3095	3095	09/29/2022	17:27:26		NA
3096	3096	09/29/2022	17:27:27		NA
3097	3097	09/29/2022	17:27:28		NA
Ch..2....Millivolts....mv. Ch..3....pH....pH. Button.Down Host.Connected					
3092			7.03	6.63	
3093			7.09	6.63	
3094			7.13	6.63	
3095			NA	NA	Logged
3096			NA	NA	
3097			NA	NA	Logged
Button.Up End.of.File					
3092					
3093					
3094					
3095					
3096					Logged
3097					Logged

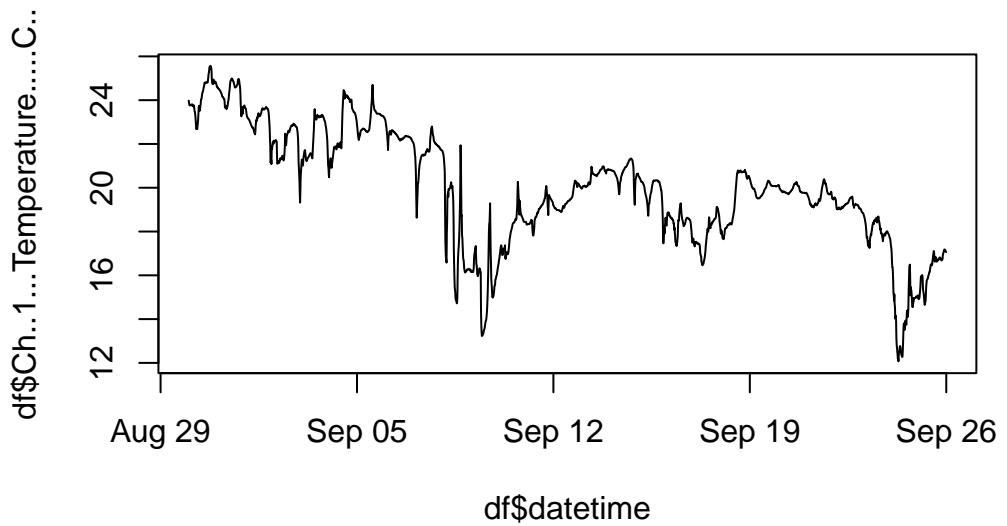
```
df$datetime <- as.POSIXct(strptime(df$date.Time..EDT., format = "%m/%d/%Y %H:%M:%S"))
plot(df$datetime, df$Ch..3...pH....pH.)
```



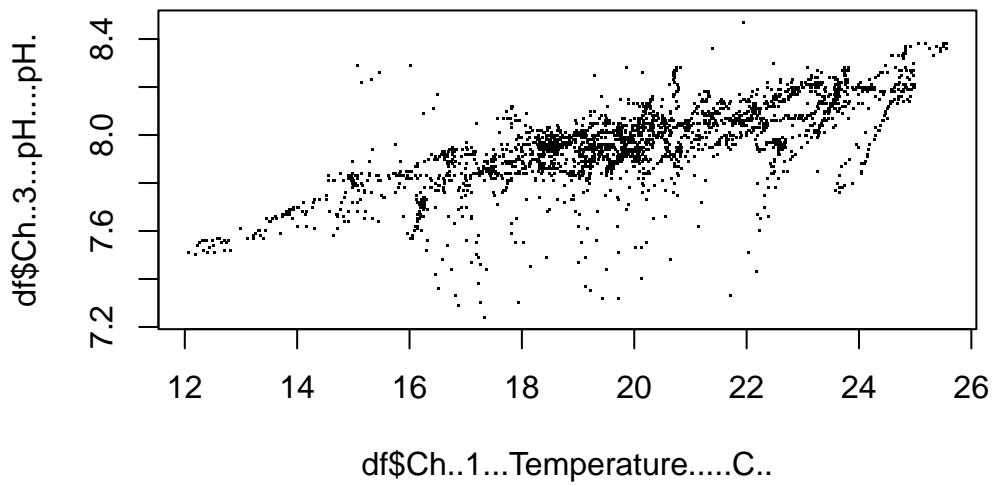
```
df <- df [df$datetime>"2022-08-30 00:00:00 EDT",]  
df <- df [df$datetime<"2022-09-26 00:00:00 EDT",]  
plot(df$datetime, df$Ch..3...pH....pH., type = "l")
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "l")
```



```
plot(df$Ch..1...Temperature.....C.., df$Ch..3...pH....pH., pch = '.')
```



```

#Metadata
SN <- 560
tris <- 8.20
tris_temp <- 24.73

data_combined_new <- data.frame(
  Site = rep("Ptown",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)

setwd(wdPtown)
# early October
# This sensor seems to be deployed at Eel pond originally, recalibrated without a change in
# and then moved to Ptown. The segment at Ptown starts late in the day on 9/27/22
filenames

[1] "20573560_Ptown 2022-06-15 18_08_38 EDT (Data EDT).csv"
[2] "20573560_Ptown 2022-06-15 18_08_38 EDT (Data EDT).csv.orig"
[3] "20573560_Ptown 2022-08-05 17_08_58 EDT (Data EDT).csv"
[4] "20573560_Ptown 2022-08-05 17_08_58 EDT (Data EDT).csv.orig"
[5] "20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv"
[6] "20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv.orig"
[7] "20573560_Ptown 2022-11-02 15_02_10 EDT (Data EDT).csv"
[8] "20573560_Ptown 2023-05-10 14_13_07 EDT (Data EDT).csv"
[9] "20573560_Ptown 2023-05-10 14_13_07 EDT (Data EDT).csv.orig"
[10] "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv"
[11] "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv.orig"
[12] "340_Ptown 2023-06-11 14_35_41 EDT (Data EDT)(1).csv"
[13] "Ptown 2022-05-17 14_31_47 EDT (Data EDT) 2.csv"
[14] "Ptown 2022-05-17 14_31_47 EDT (Data EDT) 2.csv.orig"
[15] "Ptown 2022-05-17 14_31_47 EDT (Data EDT).csv"
[16] "Ptown 2022-05-17 14_31_47 EDT (Data EDT).csv.orig"
[17] "Ptown 2022-06-27 15_06_47 EDT (Data EDT).csv"
[18] "Ptown 2022-06-27 15_06_47 EDT (Data EDT).csv.orig"

```

```

[19] "Ptown_075 2022-08-29 21_52_54 EDT (Data EDT).csv"
[20] "Ptown_075 2022-08-29 21_52_54 EDT (Data EDT).csv.orig"
[21] "Ptown_076 2022-12-05 21_20_00 EST (Data EST).csv"
[22] "Ptown_076 2022-12-05 21_20_00 EST (Data EST).csv.orig"
[23] "Ptown_20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv"
[24] "Ptown_20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv.orig"

open_file <- "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv"
df <- read.csv(open_file, stringsAsFactors = F)
head(df)

X. Date.Time..EST.EDT. Ch..1...Temperature.....C.. Ch..2...Millivolts....mv.
1 1 08/28/2022 14:03:02 24.65 -178.86
2 2 08/28/2022 14:12:50 NA NA
3 3 08/28/2022 14:12:51 NA NA
4 4 08/28/2022 14:12:53 NA NA
5 5 08/28/2022 14:18:02 24.63 152.60
6 6 08/28/2022 14:33:02 25.09 156.57
Ch..3...pH....pH. Button.Down Button.Up Host.Connected Start.pH.Calibration
1 9.93
2 NA Logged
3 NA Logged
4 NA Logged
5 4.12
6 4.06
pH.Calibration.Values pH.Calibration.Buffers End.pH.Calibration Stopped
1
2
3
4
5
6
End.of.File
1
2
3
4
5
6

tail(df,80)

```

	X. Date.Time..EST.EDT.	Ch..1...Temperature.....C..
6768	6768 11/06/2022 20:18:02	16.08
6769	6769 11/06/2022 20:33:02	16.06
6770	6770 11/06/2022 20:48:02	16.08
6771	6771 11/06/2022 21:03:02	16.08
6772	6772 11/06/2022 21:18:02	16.06
6773	6773 11/06/2022 21:33:02	16.03
6774	6774 11/06/2022 21:48:02	16.01
6775	6775 11/06/2022 22:03:02	15.99
6776	6776 11/06/2022 22:18:02	15.99
6777	6777 11/06/2022 22:33:02	15.99
6778	6778 11/06/2022 22:48:02	16.01
6779	6779 11/06/2022 23:03:02	16.01
6780	6780 11/06/2022 23:18:02	16.01
6781	6781 11/06/2022 23:33:02	16.01
6782	6782 11/06/2022 23:48:02	16.03
6783	6783 11/07/2022 00:03:02	16.06
6784	6784 11/07/2022 00:18:02	16.06
6785	6785 11/07/2022 00:33:02	16.06
6786	6786 11/07/2022 00:48:02	16.06
6787	6787 11/07/2022 01:03:02	16.06
6788	6788 11/07/2022 01:18:02	16.03
6789	6789 11/07/2022 01:33:02	16.01
6790	6790 11/07/2022 01:48:02	15.99
6791	6791 11/07/2022 02:03:02	15.99
6792	6792 11/07/2022 02:18:02	15.96
6793	6793 11/07/2022 02:33:02	15.94
6794	6794 11/07/2022 02:48:02	15.91
6795	6795 11/07/2022 03:03:02	15.87
6796	6796 11/07/2022 03:18:02	15.84
6797	6797 11/07/2022 03:33:02	15.82
6798	6798 11/07/2022 03:48:02	15.80
6799	6799 11/07/2022 04:03:02	15.75
6800	6800 11/07/2022 04:18:02	15.72
6801	6801 11/07/2022 04:33:02	15.75
6802	6802 11/07/2022 04:48:02	15.77
6803	6803 11/07/2022 05:03:02	15.75
6804	6804 11/07/2022 05:18:02	15.80
6805	6805 11/07/2022 05:33:02	15.84
6806	6806 11/07/2022 05:48:02	15.87
6807	6807 11/07/2022 06:03:02	15.89
6808	6808 11/07/2022 06:18:02	15.89
6809	6809 11/07/2022 06:33:02	15.91

6810	6810	11/07/2022	06:48:02		15.91
6811	6811	11/07/2022	07:03:02		15.94
6812	6812	11/07/2022	07:18:02		15.94
6813	6813	11/07/2022	07:33:02		15.96
6814	6814	11/07/2022	07:48:02		15.96
6815	6815	11/07/2022	08:03:02		15.99
6816	6816	11/07/2022	08:18:02		16.01
6817	6817	11/07/2022	08:33:02		16.03
6818	6818	11/07/2022	08:48:02		16.06
6819	6819	11/07/2022	09:03:02		16.06
6820	6820	11/07/2022	09:18:02		16.06
6821	6821	11/07/2022	09:33:02		16.08
6822	6822	11/07/2022	09:48:02		16.11
6823	6823	11/07/2022	10:03:02		16.11
6824	6824	11/07/2022	10:18:02		16.11
6825	6825	11/07/2022	10:33:02		16.13
6826	6826	11/07/2022	10:48:02		16.15
6827	6827	11/07/2022	11:03:02		16.18
6828	6828	11/07/2022	11:18:02		16.22
6829	6829	11/07/2022	11:33:02		16.25
6830	6830	11/07/2022	11:48:02		16.25
6831	6831	11/07/2022	12:03:02		16.22
6832	6832	11/07/2022	12:18:02		16.22
6833	6833	11/07/2022	12:33:02		16.22
6834	6834	11/07/2022	12:48:02		16.27
6835	6835	11/07/2022	13:03:02		16.30
6836	6836	11/07/2022	13:18:02		16.32
6837	6837	11/07/2022	13:33:02		16.32
6838	6838	11/07/2022	13:48:02		16.34
6839	6839	11/07/2022	14:03:02		16.42
6840	6840	11/07/2022	14:18:02		16.53
6841	6841	11/07/2022	14:33:02		16.82
6842	6842	11/07/2022	14:48:02		17.08
6843	6843	11/07/2022	15:03:02		17.08
6844	6844	11/07/2022	15:10:04		NA
6845	6845	11/07/2022	15:10:05		NA
6846	6846	11/07/2022	15:10:09		NA
6847	6847	11/07/2022	15:10:40		NA
Ch...2...Millivolts....mv. Ch...3...pH....pH. Button.Down Button.Up					
6768			-64.69		7.97
6769			-64.55		7.97
6770			-64.52		7.97
6771			-64.36		7.96

6772	-64.25	7.96
6773	-64.21	7.96
6774	-64.00	7.96
6775	-63.85	7.96
6776	-64.30	7.96
6777	-63.78	7.95
6778	-63.22	7.94
6779	-62.71	7.94
6780	-62.49	7.93
6781	-62.24	7.93
6782	-61.89	7.92
6783	-61.66	7.92
6784	-61.64	7.92
6785	-61.46	7.91
6786	-61.74	7.92
6787	-61.97	7.92
6788	-62.08	7.92
6789	-62.28	7.93
6790	-62.03	7.92
6791	-61.81	7.92
6792	-60.53	7.90
6793	-59.64	7.88
6794	-58.67	7.86
6795	-58.45	7.86
6796	-58.30	7.86
6797	-57.08	7.83
6798	-55.08	7.80
6799	-52.36	7.75
6800	-49.95	7.71
6801	-51.99	7.74
6802	-53.28	7.77
6803	-53.67	7.77
6804	-54.91	7.80
6805	-55.33	7.80
6806	-55.11	7.80
6807	-55.20	7.80
6808	-55.42	7.80
6809	-55.92	7.81
6810	-55.91	7.81
6811	-55.97	7.81
6812	-55.74	7.81
6813	-55.56	7.81
6814	-55.61	7.81

6815	-55.64	7.81
6816	-56.36	7.82
6817	-55.81	7.81
6818	-56.49	7.82
6819	-56.92	7.83
6820	-57.55	7.84
6821	-56.56	7.82
6822	-57.86	7.85
6823	-57.19	7.84
6824	-56.30	7.82
6825	-56.70	7.83
6826	-57.33	7.84
6827	-58.39	7.86
6828	-57.25	7.84
6829	-57.61	7.84
6830	-58.63	7.86
6831	-59.11	7.87
6832	-59.38	7.87
6833	-58.94	7.87
6834	-58.97	7.87
6835	-57.60	7.84
6836	-57.11	7.83
6837	-56.69	7.83
6838	-56.89	7.83
6839	-57.97	7.85
6840	-58.31	7.85
6841	-58.80	7.86
6842	-61.44	7.91
6843	-62.41	7.93
6844	NA	NA
6845	NA	NA
6846	NA	NA
6847	NA	NA
Host.Connected Start.pH.Calibration pH.Calibration.Values		
6768		
6769		
6770		
6771		
6772		
6773		
6774		
6775		
6776		

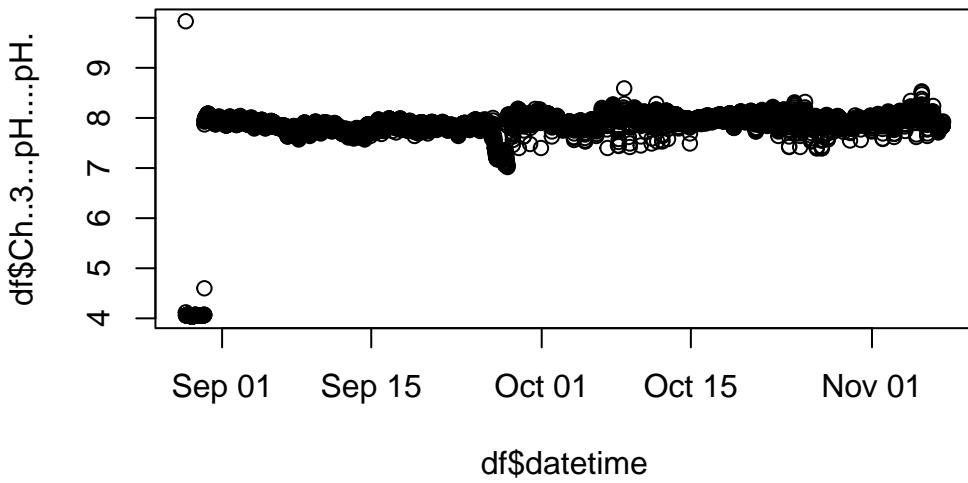
6777  
6778  
6779  
6780  
6781  
6782  
6783  
6784  
6785  
6786  
6787  
6788  
6789  
6790  
6791  
6792  
6793  
6794  
6795  
6796  
6797  
6798  
6799  
6800  
6801  
6802  
6803  
6804  
6805  
6806  
6807  
6808  
6809  
6810  
6811  
6812  
6813  
6814  
6815  
6816  
6817  
6818  
6819

6820  
6821  
6822  
6823  
6824  
6825  
6826  
6827  
6828  
6829  
6830  
6831  
6832  
6833  
6834  
6835  
6836  
6837  
6838  
6839  
6840  
6841  
6842  
6843  
6844  
6845  
6846        Logged  
6847  
pH.Calibration.Buffers End.pH.Calibration Stopped End.of.File  
6768  
6769  
6770  
6771  
6772  
6773  
6774  
6775  
6776  
6777  
6778  
6779  
6780  
6781

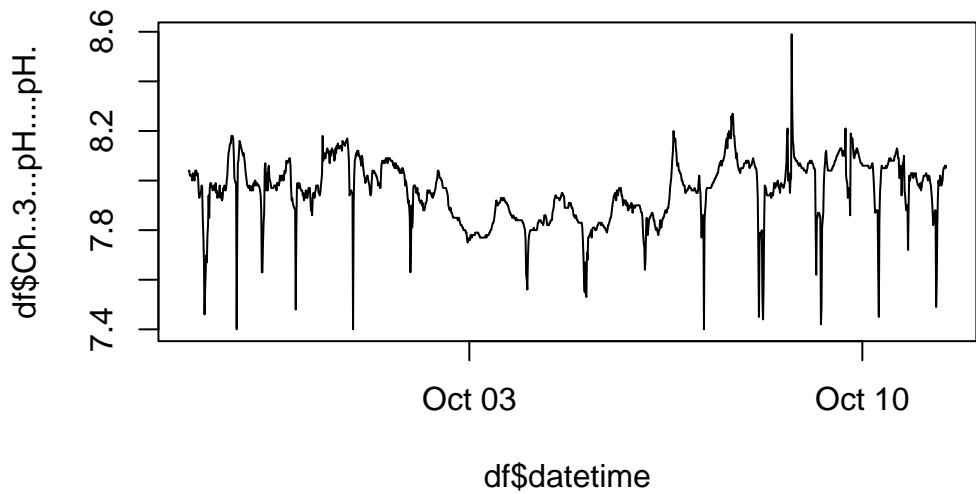
6782  
6783  
6784  
6785  
6786  
6787  
6788  
6789  
6790  
6791  
6792  
6793  
6794  
6795  
6796  
6797  
6798  
6799  
6800  
6801  
6802  
6803  
6804  
6805  
6806  
6807  
6808  
6809  
6810  
6811  
6812  
6813  
6814  
6815  
6816  
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6818  
6819  
6820  
6821  
6822  
6823  
6824

```
6825  
6826  
6827  
6828  
6829  
6830  
6831  
6832  
6833  
6834  
6835  
6836  
6837  
6838  
6839  
6840  
6841  
6842  
6843  
6844  
6845  
6846  
6847           Logged      Logged
```

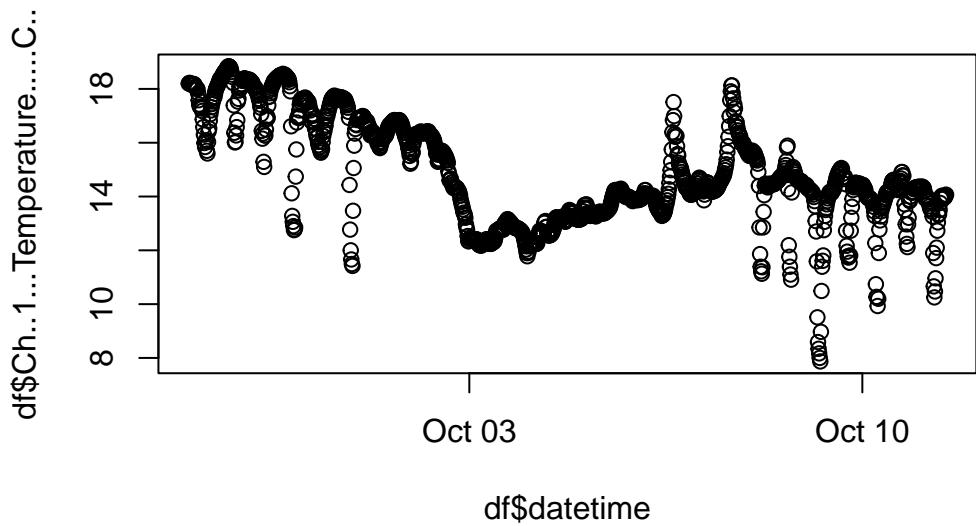
```
df$datetime <- as.POSIXct(strptime(df>Date.Time..EST., format = "%m/%d/%Y %H:%M:%S")) #Swi  
plot(df$datetime, df$Ch..3...pH....pH.)
```



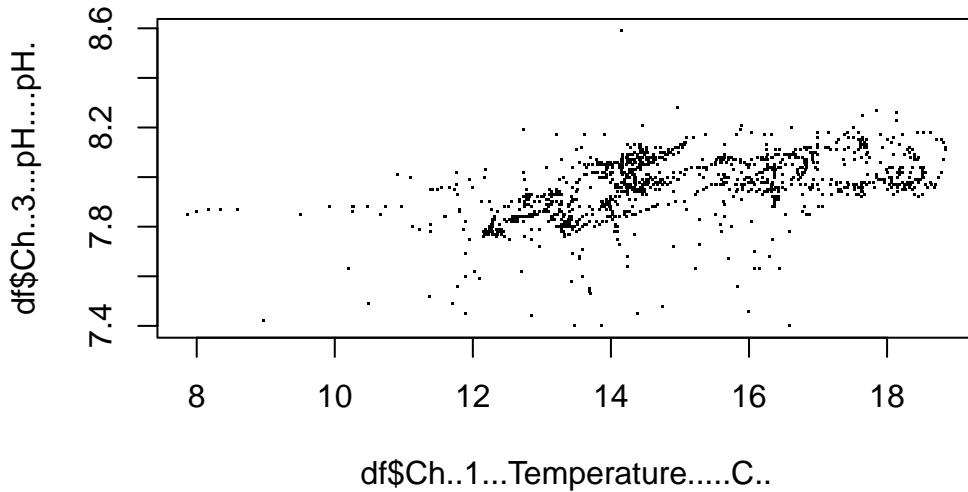
```
# df <- df[df$datetime>"2022-09-25 00:00:00 EDT",]
# df <- df[df$datetime<"2022-09-29 13:00:00 EDT",]
df <- df[df$datetime>"2022-09-28 00:00:00 EDT",]
df <- df[df$datetime<"2022-10-11 12:00:00 EDT",]
#df <- df[df$datetime<"2022-10-12 00:00:00 EDT",]
#df <- df[df$datetime<"2022-11-07 13:00:00 EDT",]
plot(df$datetime, df$Ch..3...pH....pH., type = "l")
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "p")
```



```
plot(df$Ch..1...Temperature.....C.., df$Ch..3...pH....pH., pch = '.')
```



```
#Metadata
SN <- 340
tris <- NA
tris_temp <- NA

data_combined_new <- data.frame(
  Site = rep("Ptown",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature.....C..,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)
```

```

setwd(wdPtown)
# late October
# This sensor seems to be deployed at Eel pond originally, recalibrated without a change in
# and then moved to Ptown. The segment at Ptown starts late in the day on 9/27/22
filenames

[1] "20573560_Ptown 2022-06-15 18_08_38 EDT (Data EDT).csv"
[2] "20573560_Ptown 2022-06-15 18_08_38 EDT (Data EDT).csv.orig"
[3] "20573560_Ptown 2022-08-05 17_08_58 EDT (Data EDT).csv"
[4] "20573560_Ptown 2022-08-05 17_08_58 EDT (Data EDT).csv.orig"
[5] "20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv"
[6] "20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv.orig"
[7] "20573560_Ptown 2022-11-02 15_02_10 EDT (Data EDT).csv"
[8] "20573560_Ptown 2023-05-10 14_13_07 EDT (Data EDT).csv"
[9] "20573560_Ptown 2023-05-10 14_13_07 EDT (Data EDT).csv.orig"
[10] "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv"
[11] "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv.orig"
[12] "340_Ptown 2023-06-11 14_35_41 EDT (Data EDT)(1).csv"
[13] "Ptown 2022-05-17 14_31_47 EDT (Data EDT) 2.csv"
[14] "Ptown 2022-05-17 14_31_47 EDT (Data EDT) 2.csv.orig"
[15] "Ptown 2022-05-17 14_31_47 EDT (Data EDT).csv"
[16] "Ptown 2022-05-17 14_31_47 EDT (Data EDT).csv.orig"
[17] "Ptown 2022-06-27 15_06_47 EDT (Data EDT).csv"
[18] "Ptown 2022-06-27 15_06_47 EDT (Data EDT).csv.orig"
[19] "Ptown_075 2022-08-29 21_52_54 EDT (Data EDT).csv"
[20] "Ptown_075 2022-08-29 21_52_54 EDT (Data EDT).csv.orig"
[21] "Ptown_076 2022-12-05 21_20_00 EST (Data EST).csv"
[22] "Ptown_076 2022-12-05 21_20_00 EST (Data EST).csv.orig"
[23] "Ptown_20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv"
[24] "Ptown_20573560_Ptown 2022-09-29 17_27_52 EDT (Data EDT).csv.orig"

open_file <- "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv"
df <- read.csv(open_file, stringsAsFactors = F)
head(df)

```

	X. Date.Time..EST.EDT. Ch..1...Temperature.....C.. Ch..2...Millivolts....mv.	
1	1 08/28/2022 14:03:02	24.65
2	2 08/28/2022 14:12:50	NA
3	3 08/28/2022 14:12:51	NA
4	4 08/28/2022 14:12:53	NA

```

5 5 08/28/2022 14:18:02          24.63          152.60
6 6 08/28/2022 14:33:02          25.09          156.57
Ch..3...pH....pH. Button.Down Button.Up Host.Connected Start.pH.Calibration
1           9.93
2           NA      Logged
3           NA      Logged
4           NA      Logged
5           4.12
6           4.06
pH.Calibration.Values pH.Calibration.Buffers End.pH.Calibration Stopped
1
2
3
4
5
6
End.of.File
1
2
3
4
5
6

```

```
tail(df,80)
```

	X. Date.Time..EST.EDT.	Ch..1...Temperature.....C..
6768	6768 11/06/2022 20:18:02	16.08
6769	6769 11/06/2022 20:33:02	16.06
6770	6770 11/06/2022 20:48:02	16.08
6771	6771 11/06/2022 21:03:02	16.08
6772	6772 11/06/2022 21:18:02	16.06
6773	6773 11/06/2022 21:33:02	16.03
6774	6774 11/06/2022 21:48:02	16.01
6775	6775 11/06/2022 22:03:02	15.99
6776	6776 11/06/2022 22:18:02	15.99
6777	6777 11/06/2022 22:33:02	15.99
6778	6778 11/06/2022 22:48:02	16.01
6779	6779 11/06/2022 23:03:02	16.01
6780	6780 11/06/2022 23:18:02	16.01
6781	6781 11/06/2022 23:33:02	16.01
6782	6782 11/06/2022 23:48:02	16.03

6783	6783	11/07/2022	00:03:02	16.06
6784	6784	11/07/2022	00:18:02	16.06
6785	6785	11/07/2022	00:33:02	16.06
6786	6786	11/07/2022	00:48:02	16.06
6787	6787	11/07/2022	01:03:02	16.06
6788	6788	11/07/2022	01:18:02	16.03
6789	6789	11/07/2022	01:33:02	16.01
6790	6790	11/07/2022	01:48:02	15.99
6791	6791	11/07/2022	02:03:02	15.99
6792	6792	11/07/2022	02:18:02	15.96
6793	6793	11/07/2022	02:33:02	15.94
6794	6794	11/07/2022	02:48:02	15.91
6795	6795	11/07/2022	03:03:02	15.87
6796	6796	11/07/2022	03:18:02	15.84
6797	6797	11/07/2022	03:33:02	15.82
6798	6798	11/07/2022	03:48:02	15.80
6799	6799	11/07/2022	04:03:02	15.75
6800	6800	11/07/2022	04:18:02	15.72
6801	6801	11/07/2022	04:33:02	15.75
6802	6802	11/07/2022	04:48:02	15.77
6803	6803	11/07/2022	05:03:02	15.75
6804	6804	11/07/2022	05:18:02	15.80
6805	6805	11/07/2022	05:33:02	15.84
6806	6806	11/07/2022	05:48:02	15.87
6807	6807	11/07/2022	06:03:02	15.89
6808	6808	11/07/2022	06:18:02	15.89
6809	6809	11/07/2022	06:33:02	15.91
6810	6810	11/07/2022	06:48:02	15.91
6811	6811	11/07/2022	07:03:02	15.94
6812	6812	11/07/2022	07:18:02	15.94
6813	6813	11/07/2022	07:33:02	15.96
6814	6814	11/07/2022	07:48:02	15.96
6815	6815	11/07/2022	08:03:02	15.99
6816	6816	11/07/2022	08:18:02	16.01
6817	6817	11/07/2022	08:33:02	16.03
6818	6818	11/07/2022	08:48:02	16.06
6819	6819	11/07/2022	09:03:02	16.06
6820	6820	11/07/2022	09:18:02	16.06
6821	6821	11/07/2022	09:33:02	16.08
6822	6822	11/07/2022	09:48:02	16.11
6823	6823	11/07/2022	10:03:02	16.11
6824	6824	11/07/2022	10:18:02	16.11
6825	6825	11/07/2022	10:33:02	16.13

6826	6826	11/07/2022	10:48:02		16.15
6827	6827	11/07/2022	11:03:02		16.18
6828	6828	11/07/2022	11:18:02		16.22
6829	6829	11/07/2022	11:33:02		16.25
6830	6830	11/07/2022	11:48:02		16.25
6831	6831	11/07/2022	12:03:02		16.22
6832	6832	11/07/2022	12:18:02		16.22
6833	6833	11/07/2022	12:33:02		16.22
6834	6834	11/07/2022	12:48:02		16.27
6835	6835	11/07/2022	13:03:02		16.30
6836	6836	11/07/2022	13:18:02		16.32
6837	6837	11/07/2022	13:33:02		16.32
6838	6838	11/07/2022	13:48:02		16.34
6839	6839	11/07/2022	14:03:02		16.42
6840	6840	11/07/2022	14:18:02		16.53
6841	6841	11/07/2022	14:33:02		16.82
6842	6842	11/07/2022	14:48:02		17.08
6843	6843	11/07/2022	15:03:02		17.08
6844	6844	11/07/2022	15:10:04		NA
6845	6845	11/07/2022	15:10:05		NA
6846	6846	11/07/2022	15:10:09		NA
6847	6847	11/07/2022	15:10:40		NA
Ch..2...Millivolts....mv. Ch..3...pH....pH. Button.Down Button.Up					
6768		-64.69		7.97	
6769		-64.55		7.97	
6770		-64.52		7.97	
6771		-64.36		7.96	
6772		-64.25		7.96	
6773		-64.21		7.96	
6774		-64.00		7.96	
6775		-63.85		7.96	
6776		-64.30		7.96	
6777		-63.78		7.95	
6778		-63.22		7.94	
6779		-62.71		7.94	
6780		-62.49		7.93	
6781		-62.24		7.93	
6782		-61.89		7.92	
6783		-61.66		7.92	
6784		-61.64		7.92	
6785		-61.46		7.91	
6786		-61.74		7.92	
6787		-61.97		7.92	

6788	-62.08	7.92
6789	-62.28	7.93
6790	-62.03	7.92
6791	-61.81	7.92
6792	-60.53	7.90
6793	-59.64	7.88
6794	-58.67	7.86
6795	-58.45	7.86
6796	-58.30	7.86
6797	-57.08	7.83
6798	-55.08	7.80
6799	-52.36	7.75
6800	-49.95	7.71
6801	-51.99	7.74
6802	-53.28	7.77
6803	-53.67	7.77
6804	-54.91	7.80
6805	-55.33	7.80
6806	-55.11	7.80
6807	-55.20	7.80
6808	-55.42	7.80
6809	-55.92	7.81
6810	-55.91	7.81
6811	-55.97	7.81
6812	-55.74	7.81
6813	-55.56	7.81
6814	-55.61	7.81
6815	-55.64	7.81
6816	-56.36	7.82
6817	-55.81	7.81
6818	-56.49	7.82
6819	-56.92	7.83
6820	-57.55	7.84
6821	-56.56	7.82
6822	-57.86	7.85
6823	-57.19	7.84
6824	-56.30	7.82
6825	-56.70	7.83
6826	-57.33	7.84
6827	-58.39	7.86
6828	-57.25	7.84
6829	-57.61	7.84
6830	-58.63	7.86

6831	-59.11	7.87
6832	-59.38	7.87
6833	-58.94	7.87
6834	-58.97	7.87
6835	-57.60	7.84
6836	-57.11	7.83
6837	-56.69	7.83
6838	-56.89	7.83
6839	-57.97	7.85
6840	-58.31	7.85
6841	-58.80	7.86
6842	-61.44	7.91
6843	-62.41	7.93
6844	NA	NA      Logged
6845	NA	NA      Logged
6846	NA	NA
6847	NA	NA

Host.Connected Start.pH.Calibration pH.Calibration.Values

6768
6769
6770
6771
6772
6773
6774
6775
6776
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6778
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6781
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6789
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6792

6793  
6794  
6795  
6796  
6797  
6798  
6799  
6800  
6801  
6802  
6803  
6804  
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6807  
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6809  
6810  
6811  
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6813  
6814  
6815  
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6832  
6833  
6834  
6835

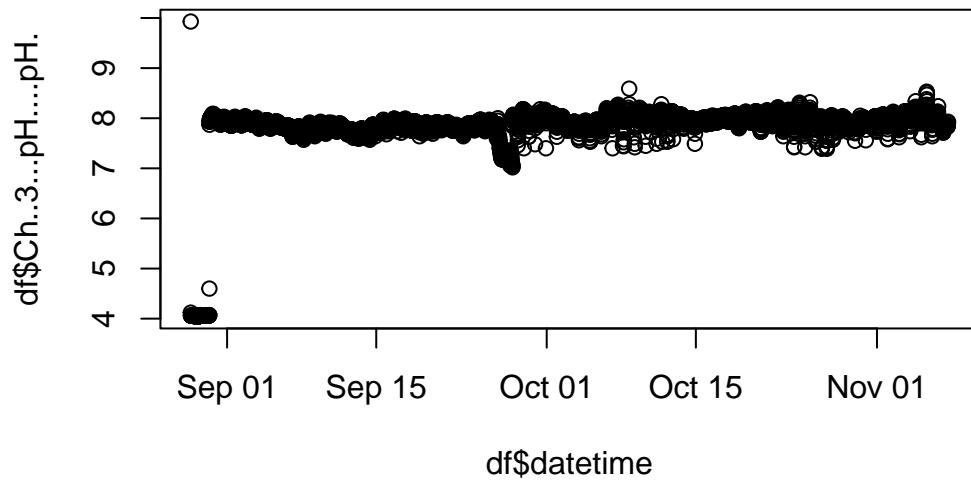
6836  
6837  
6838  
6839  
6840  
6841  
6842  
6843  
6844  
6845  
6846           Logged  
6847  
pH.Calibration.Buffers End.pH.Calibration Stopped End.of.File  
6768  
6769  
6770  
6771  
6772  
6773  
6774  
6775  
6776  
6777  
6778  
6779  
6780  
6781  
6782  
6783  
6784  
6785  
6786  
6787  
6788  
6789  
6790  
6791  
6792  
6793  
6794  
6795  
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6797

6798  
6799  
6800  
6801  
6802  
6803  
6804  
6805  
6806  
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6809  
6810  
6811  
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6836  
6837  
6838  
6839  
6840

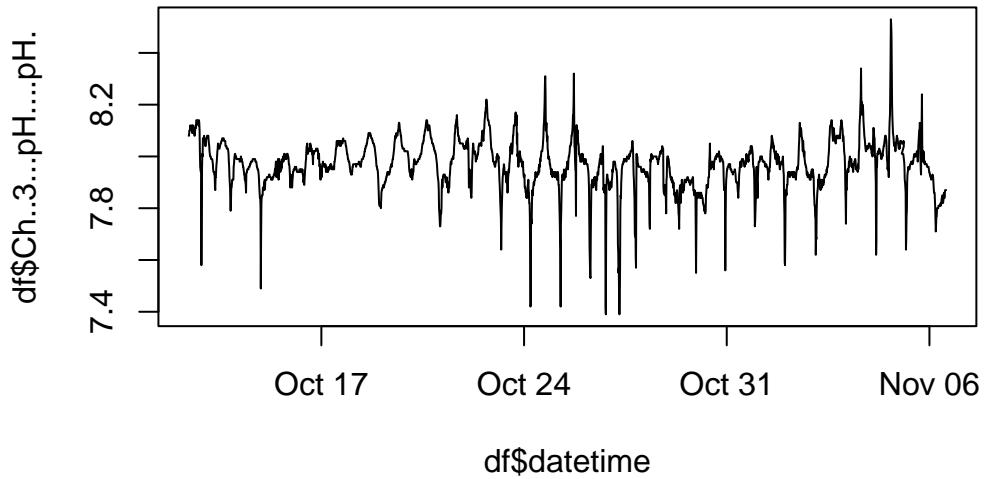
```
6841  
6842  
6843  
6844  
6845  
6846  
6847
```

Logged      Logged

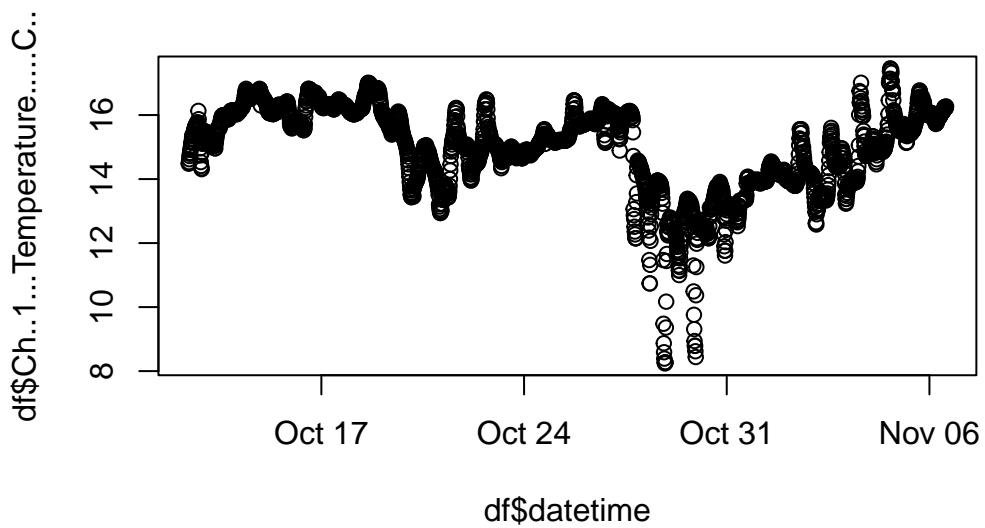
```
df$datetime <- as.POSIXct(strptime(df>Date.Time..EST., format = "%m/%d/%Y %H:%M:%S")) #Swi  
plot(df$datetime, df$Ch..3...pH....pH.)
```



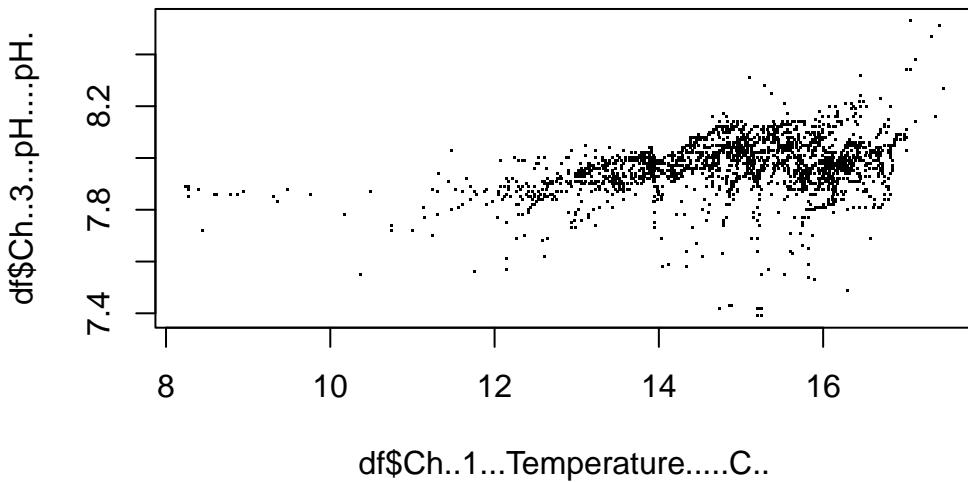
```
#df <- df[df$datetime>"2022-09-28 00:00:00 EDT",]  
#df <- df[df$datetime<"2022-10-11 06:00:00 EDT",]  
df <- df[df$datetime>"2022-10-12 10:00:00 EDT",]  
df <- df[df$datetime<"2022-11-07 13:00:00 EDT",]  
plot(df$datetime, df$Ch..3...pH....pH., type = "l")
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "p")
```



```
plot(df$Ch..1...Temperature.....C., df$Ch..3...pH....pH., pch = '.')
```



```
#Metadata
SN <- 340
tris <- NA
tris_temp <- NA

data_combined_new <- data.frame(
  Site = rep("Ptown",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature.....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)
```

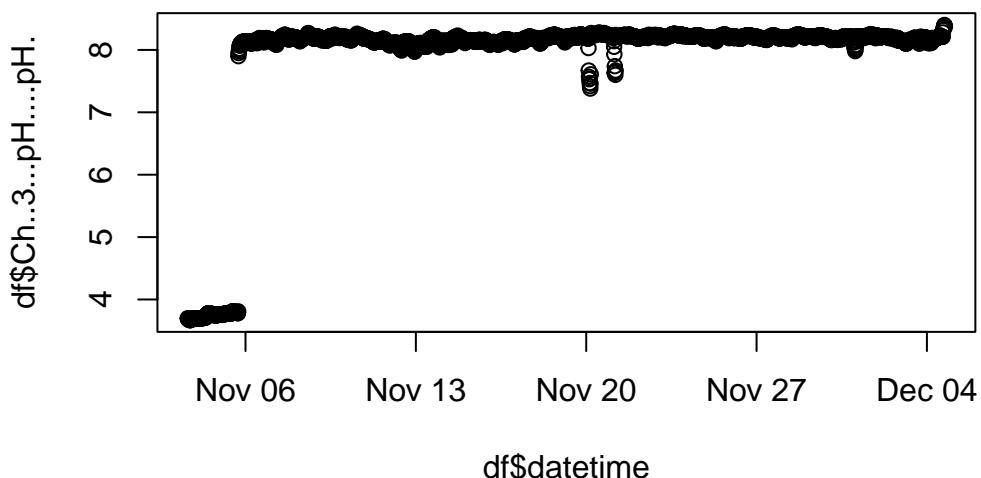
```

#Moved up from Eel. It seems like this sensor was previously an Eel Pond sensor but was mo

setwd(wdEel)
# November
#(open_file <- filenames[3])
open_file <- "20573560_Ptown 2022-12-05 16_55_15 EST (Data EST)_actuallyEel.csv"

df <- read.csv(open_file, stringsAsFactors = F)
df$datetime <- as.POSIXct(strptime(df>Date.Time..EST., format = "%m/%d/%Y %H:%M:%S")) #Ch
plot(df$datetime, df$Ch..3...pH....pH.)

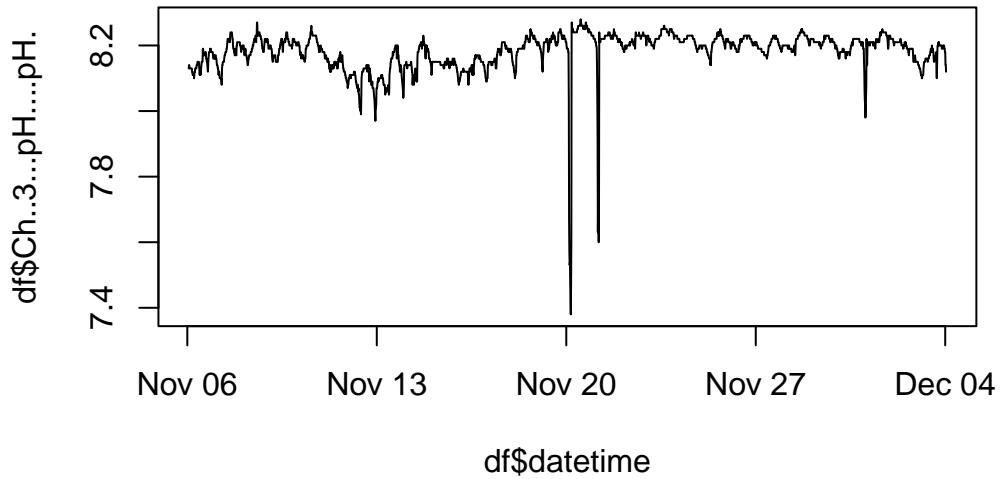
```



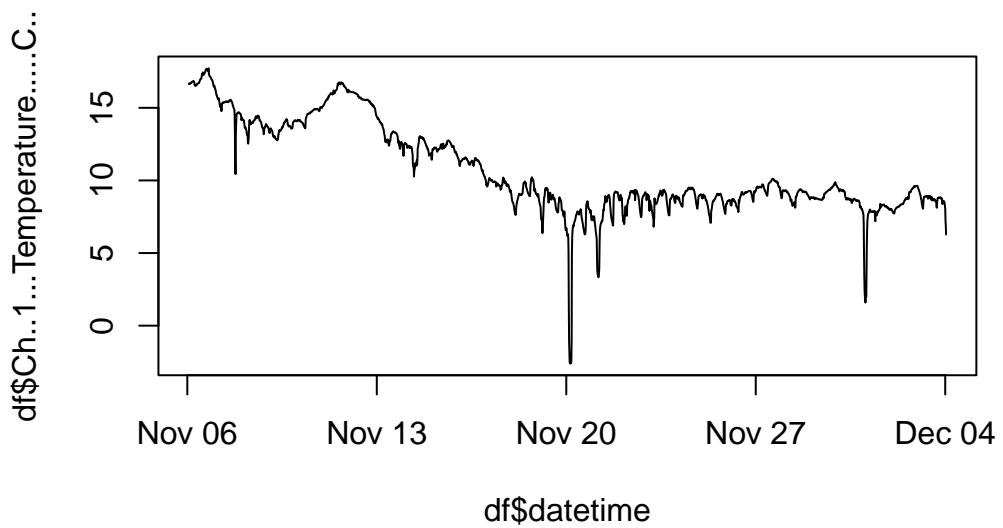
```

df <- df[df$datetime>"2022-11-07 00:00:00 EDT",]
df <- df[df$datetime<"2022-12-05 00:00:00 EDT",]
plot(df$datetime, df$Ch..3...pH....pH., type = "l")

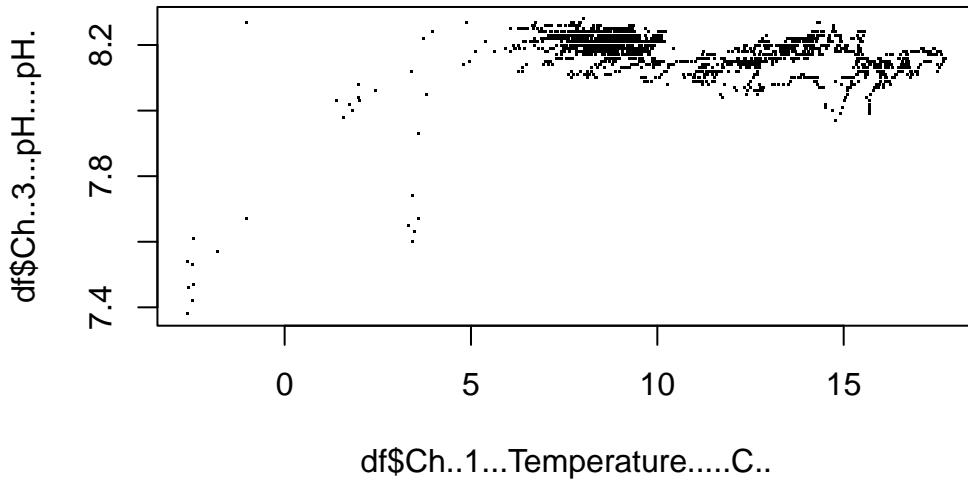
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "l")
```



```
plot(df$Ch..1...Temperature.....C.., df$Ch..3...pH....pH., pch = '.')
```



```
#Metadata
SN <- 560
tris <- 8.30
tris_temp <- 22.37

data_combined_new <- data.frame(
  Site = rep("Ptown",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature.....C..,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)
```

```

setwd(wdPtown)
# skip to April to avoid freezing temps

open_file <- "20573560_Ptown 2023-05-10 14_13_07 EDT (Data EDT).csv"
df <- read.csv(open_file, stringsAsFactors = F)
head(df)

```

	X.	Date.Time..EDT.	Ch..1...Temperature.....C.	Ch..2...Millivolts....mv.
1	1	4/17/23 12:00	21.17	96.46
2	2	4/17/23 12:15	21.84	96.67
3	3	4/17/23 12:30	22.13	96.92
4	4	4/17/23 12:45	22.20	97.14
5	5	4/17/23 13:00	22.30	97.21
6	6	4/17/23 13:15	22.35	97.28

	Ch..3...pH....pH.	Button.Down	Button.Up	Host.Connected	End.of.File
1	4.82				
2	4.82				
3	4.82				
4	4.82				
5	4.82				
6	4.82				

```
tail(df,80)
```

	X.	Date.Time..EDT.	Ch..1...Temperature.....C.	Ch..2...Millivolts....mv.
2141	2141	5/9/23 19:00	13.14	-86.77
2142	2142	5/9/23 19:15	13.06	-87.05
2143	2143	5/9/23 19:30	13.02	-87.44
2144	2144	5/9/23 19:45	12.92	-87.80
2145	2145	5/9/23 20:00	12.85	-87.85
2146	2146	5/9/23 20:15	12.73	-87.71
2147	2147	5/9/23 20:30	12.63	-87.99
2148	2148	5/9/23 20:45	12.63	-88.58
2149	2149	5/9/23 21:00	12.46	-88.19
2150	2150	5/9/23 21:15	12.27	-87.89
2151	2151	5/9/23 21:30	12.17	-87.35
2152	2152	5/9/23 21:45	12.12	-87.25
2153	2153	5/9/23 22:00	12.19	-87.57
2154	2154	5/9/23 22:15	12.22	-87.17
2155	2155	5/9/23 22:30	12.19	-86.77

2156	2156	5/9/23 22:45	12.17	-85.92
2157	2157	5/9/23 23:00	12.15	-84.64
2158	2158	5/9/23 23:15	12.10	-84.61
2159	2159	5/9/23 23:30	12.12	-84.07
2160	2160	5/9/23 23:45	12.15	-83.60
2161	2161	5/10/23 0:00	12.17	-83.74
2162	2162	5/10/23 0:15	12.17	-83.30
2163	2163	5/10/23 0:30	12.15	-82.99
2164	2164	5/10/23 0:45	12.17	-82.52
2165	2165	5/10/23 1:00	12.19	-82.32
2166	2166	5/10/23 1:15	12.10	-81.21
2167	2167	5/10/23 1:30	12.12	-81.31
2168	2168	5/10/23 1:45	12.19	-81.66
2169	2169	5/10/23 2:00	12.24	-82.55
2170	2170	5/10/23 2:15	12.32	-82.80
2171	2171	5/10/23 2:30	12.27	-81.71
2172	2172	5/10/23 2:45	12.24	-81.72
2173	2173	5/10/23 3:00	12.27	-81.38
2174	2174	5/10/23 3:15	12.32	-81.86
2175	2175	5/10/23 3:30	12.32	-81.69
2176	2176	5/10/23 3:45	12.34	-81.88
2177	2177	5/10/23 4:00	12.36	-81.89
2178	2178	5/10/23 4:15	12.36	-81.74
2179	2179	5/10/23 4:30	12.32	-81.39
2180	2180	5/10/23 4:45	12.29	-81.42
2181	2181	5/10/23 5:00	12.29	-81.27
2182	2182	5/10/23 5:15	12.32	-81.22
2183	2183	5/10/23 5:30	12.34	-81.41
2184	2184	5/10/23 5:45	12.34	-81.38
2185	2185	5/10/23 6:00	12.34	-80.89
2186	2186	5/10/23 6:15	12.34	-81.71
2187	2187	5/10/23 6:30	12.36	-82.03
2188	2188	5/10/23 6:45	12.36	-82.14
2189	2189	5/10/23 7:00	12.36	-82.82
2190	2190	5/10/23 7:15	12.34	-82.69
2191	2191	5/10/23 7:30	12.32	-83.28
2192	2192	5/10/23 7:45	12.34	-83.46
2193	2193	5/10/23 8:00	12.36	-83.66
2194	2194	5/10/23 8:15	12.41	-83.02
2195	2195	5/10/23 8:30	12.61	-80.03
2196	2196	5/10/23 8:45	13.06	-75.30
2197	2197	5/10/23 9:00	13.47	-87.85
2198	2198	5/10/23 9:15	16.32	148.97

2199	2199	5/10/23 9:30	20.46	156.52
2200	2200	5/10/23 9:45	17.42	156.58
2201	2201	5/10/23 10:00	16.30	156.50
2202	2202	5/10/23 10:15	15.70	157.13
2203	2203	5/10/23 10:30	15.49	156.11
2204	2204	5/10/23 10:45	15.58	154.60
2205	2205	5/10/23 11:00	16.39	154.71
2206	2206	5/10/23 11:15	17.37	154.55
2207	2207	5/10/23 11:30	18.27	154.33
2208	2208	5/10/23 11:45	18.41	154.27
2209	2209	5/10/23 12:00	18.77	154.22
2210	2210	5/10/23 12:15	19.17	154.60
2211	2211	5/10/23 12:30	18.91	155.43
2212	2212	5/10/23 12:45	19.32	155.05
2213	2213	5/10/23 13:00	19.67	154.75
2214	2214	5/10/23 13:15	20.01	154.91
2215	2215	5/10/23 13:30	20.17	154.99
2216	2216	5/10/23 13:45	20.01	154.44
2217	2217	5/10/23 14:00	19.86	154.52
2218	2218	5/10/23 14:12	NA	NA
2219	2219	5/10/23 14:12	NA	NA
2220	2220	5/10/23 14:12	NA	NA

Ch...3....pH....pH. Button.Down Button.Up Host.Connected End.of.File

2141	8.18
2142	8.19
2143	8.19
2144	8.20
2145	8.20
2146	8.20
2147	8.21
2148	8.22
2149	8.21
2150	8.20
2151	8.20
2152	8.19
2153	8.20
2154	8.19
2155	8.18
2156	8.17
2157	8.14
2158	8.14
2159	8.13
2160	8.12

2161	8.13
2162	8.12
2163	8.11
2164	8.10
2165	8.10
2166	8.08
2167	8.08
2168	8.09
2169	8.10
2170	8.11
2171	8.09
2172	8.09
2173	8.08
2174	8.09
2175	8.09
2176	8.09
2177	8.09
2178	8.09
2179	8.08
2180	8.08
2181	8.08
2182	8.08
2183	8.08
2184	8.08
2185	8.07
2186	8.09
2187	8.09
2188	8.10
2189	8.11
2190	8.11
2191	8.12
2192	8.12
2193	8.13
2194	8.11
2195	8.06
2196	7.97
2197	8.20
2198	3.82
2199	3.72
2200	3.69
2201	3.68
2202	3.66
2203	3.67

```

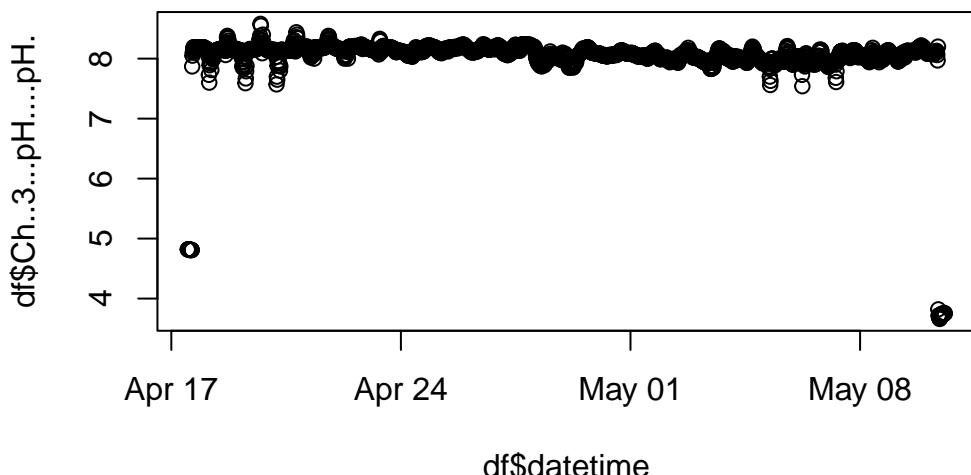
2204          3.70
2205          3.71
2206          3.72
2207          3.74
2208          3.74
2209          3.75
2210          3.74
2211          3.73
2212          3.74
2213          3.75
2214          3.75
2215          3.75
2216          3.76
2217          3.75
2218          NA      Logged
2219          NA      Logged
2220          NA      Logged      Logged

```

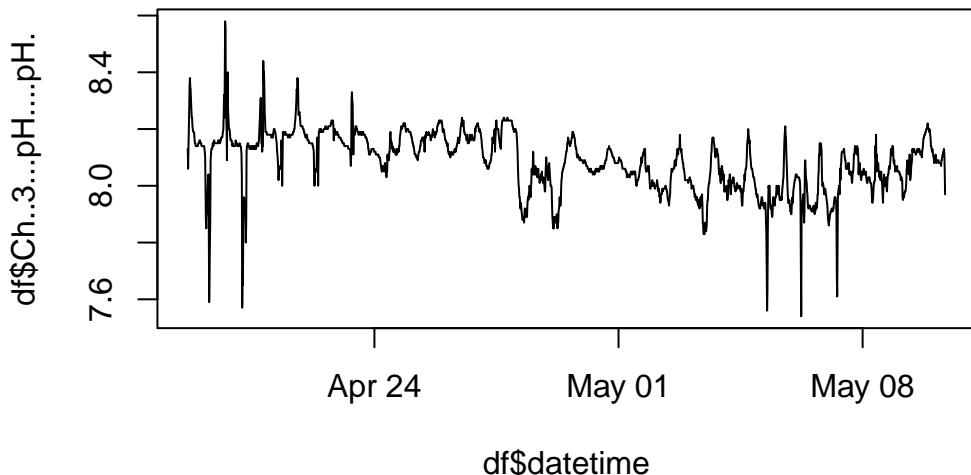
```

df$datetime <- as.POSIXct(strptime(df$date.Time..EDT., format = "%m/%d/%y %H:%M")) #Switch
plot(df$datetime, df$Ch..3...pH....pH.)

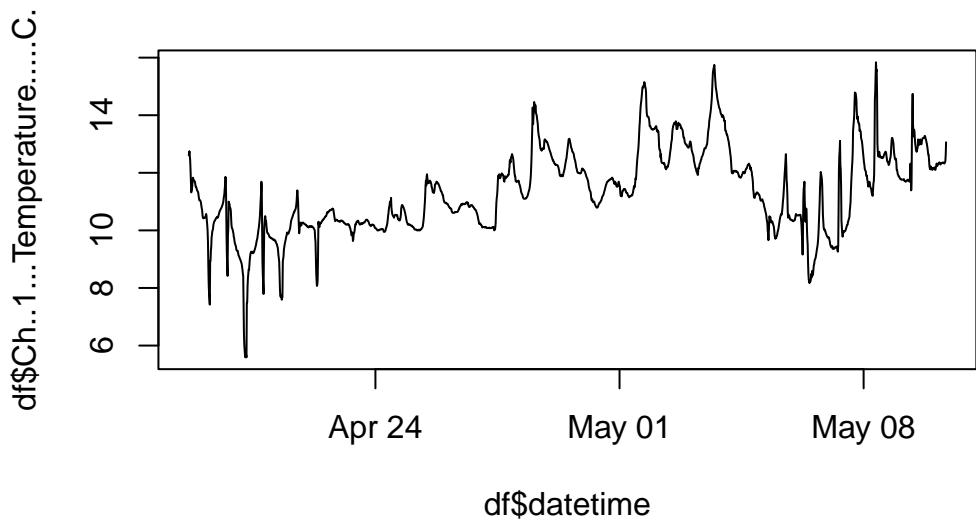
```



```
df <- df [df$datetime>"2023-04-18 15:15:15",]  
df <- df [df$datetime<"2023-05-10 09:00:00",]  
plot(df$datetime, df$Ch..3...pH....pH., type = "l")
```



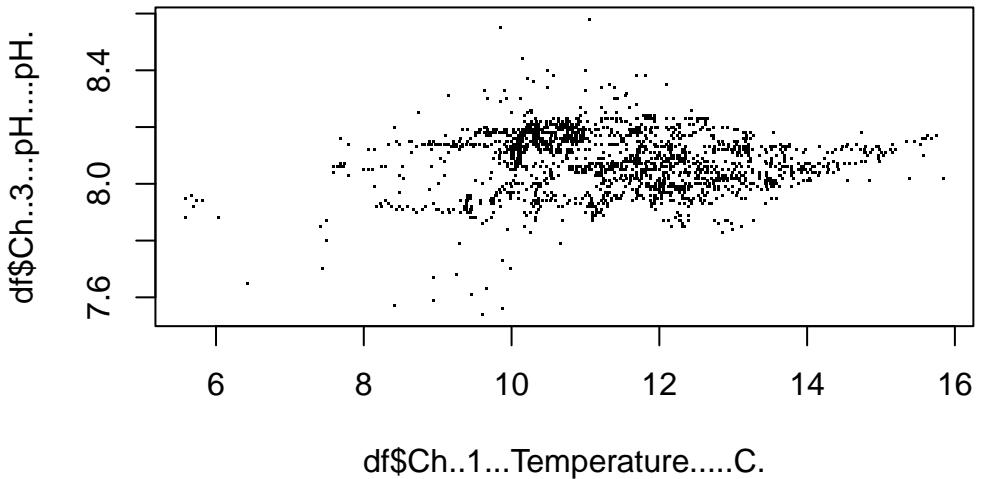
```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "l")
```



```
length(df$Ch..1....Temperature.....C.)
```

```
[1] 2086
```

```
plot(df$Ch..1....Temperature.....C., df$Ch..3....pH....pH., pch = '.')
```



```

#Metadata
SN <- 560
tris <- 8.298 #Updated 12/23/23
tris_temp <- 21.4 #Updated 12/23/23

data_combined_new <- data.frame(
  Site = rep("Ptown",times = length(df$datetime)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature.....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,times = length(df$datetime)),
  Serial_number = rep(SN,times = length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)

setwd(wdPtown)
# skip to April to avoid freezing temps

open_file <- "340_Ptown 2023-06-11 14_35_41 EDT (Data EDT)(1).csv"

```

```
df <- read.csv(open_file, stringsAsFactors = F)
head(df)
```

```
X.      Date.Time..EDT. Ch.1...Temperature.....C. Ch.2...Millivolts....mv.
1 1 05/09/2023 16:11:07                      NA                      NA
2 2 05/09/2023 16:11:08                      NA                      NA
3 3 05/09/2023 16:11:10                      NA                      NA
4 4 05/10/2023 08:00:00                   17.58                  174.33
5 5 05/10/2023 08:15:00                   17.39                  174.15
6 6 05/10/2023 08:30:00                   17.20                  174.07
```

```
Ch.3...pH....pH. Button.Down Button.Up Host.Connected End.of.File
1             NA     Logged
2             NA           Logged
3             NA           Logged
4             3.54
5             3.54
6             3.54
```

```
tail(df,80)
```

```
X.      Date.Time..EDT. Ch.1...Temperature.....C.
3026 3026 06/10/2023 19:30:00                  15.22
3027 3027 06/10/2023 19:45:00                  15.25
3028 3028 06/10/2023 20:00:00                  15.27
3029 3029 06/10/2023 20:15:00                  15.29
3030 3030 06/10/2023 20:30:00                  15.34
3031 3031 06/10/2023 20:45:00                  15.34
3032 3032 06/10/2023 21:00:00                  15.37
3033 3033 06/10/2023 21:15:00                  15.41
3034 3034 06/10/2023 21:30:00                  15.46
3035 3035 06/10/2023 21:45:00                  15.53
3036 3036 06/10/2023 22:00:00                  15.70
3037 3037 06/10/2023 22:15:00                  15.91
3038 3038 06/10/2023 22:30:00                  16.13
3039 3039 06/10/2023 22:45:00                  16.20
3040 3040 06/10/2023 23:00:00                  16.18
3041 3041 06/10/2023 23:15:00                  16.11
3042 3042 06/10/2023 23:30:00                  15.96
3043 3043 06/10/2023 23:45:00                  15.77
3044 3044 06/11/2023 00:00:00                  15.44
```

3045	3045	06/11/2023	00:15:00	15.53
3046	3046	06/11/2023	00:30:00	15.65
3047	3047	06/11/2023	00:45:00	15.53
3048	3048	06/11/2023	01:00:00	15.60
3049	3049	06/11/2023	01:15:00	15.70
3050	3050	06/11/2023	01:30:00	15.72
3051	3051	06/11/2023	01:45:00	15.68
3052	3052	06/11/2023	02:00:00	15.65
3053	3053	06/11/2023	02:15:00	15.58
3054	3054	06/11/2023	02:30:00	15.58
3055	3055	06/11/2023	02:45:00	15.60
3056	3056	06/11/2023	03:00:00	15.60
3057	3057	06/11/2023	03:15:00	15.60
3058	3058	06/11/2023	03:30:00	15.63
3059	3059	06/11/2023	03:45:00	15.65
3060	3060	06/11/2023	04:00:00	15.63
3061	3061	06/11/2023	04:15:00	15.60
3062	3062	06/11/2023	04:30:00	15.60
3063	3063	06/11/2023	04:45:00	15.58
3064	3064	06/11/2023	05:00:00	15.58
3065	3065	06/11/2023	05:15:00	15.58
3066	3066	06/11/2023	05:30:00	15.56
3067	3067	06/11/2023	05:45:00	15.56
3068	3068	06/11/2023	06:00:00	15.53
3069	3069	06/11/2023	06:15:00	15.53
3070	3070	06/11/2023	06:30:00	15.49
3071	3071	06/11/2023	06:45:00	15.49
3072	3072	06/11/2023	07:00:00	15.46
3073	3073	06/11/2023	07:15:00	15.44
3074	3074	06/11/2023	07:30:00	15.46
3075	3075	06/11/2023	07:45:00	15.46
3076	3076	06/11/2023	08:00:00	15.49
3077	3077	06/11/2023	08:15:00	15.49
3078	3078	06/11/2023	08:30:00	15.51
3079	3079	06/11/2023	08:45:00	15.56
3080	3080	06/11/2023	09:00:00	15.60
3081	3081	06/11/2023	09:15:00	15.68
3082	3082	06/11/2023	09:30:00	15.77
3083	3083	06/11/2023	09:45:00	15.82
3084	3084	06/11/2023	10:00:00	15.89
3085	3085	06/11/2023	10:15:00	15.99
3086	3086	06/11/2023	10:30:00	16.18
3087	3087	06/11/2023	10:45:00	16.51

3088	3088	06/11/2023	11:00:00	17.01
3089	3089	06/11/2023	11:15:00	17.51
3090	3090	06/11/2023	11:30:00	18.32
3091	3091	06/11/2023	11:45:00	19.13
3092	3092	06/11/2023	12:00:00	19.98
3093	3093	06/11/2023	12:15:00	21.13
3094	3094	06/11/2023	12:30:00	22.23
3095	3095	06/11/2023	12:45:00	22.90
3096	3096	06/11/2023	13:00:00	24.39
3097	3097	06/11/2023	13:15:00	24.05
3098	3098	06/11/2023	13:30:00	23.35
3099	3099	06/11/2023	13:45:00	21.99
3100	3100	06/11/2023	14:00:00	22.13
3101	3101	06/11/2023	14:15:00	22.35
3102	3102	06/11/2023	14:30:00	22.54
3103	3103	06/11/2023	14:35:14	NA
3104	3104	06/11/2023	14:35:15	NA
3105	3105	06/11/2023	14:35:16	NA
Ch.2...Millivolts....mv. Ch.3...pH....pH. Button.Down Button.Up				
3026		-85.72	8.15	
3027		-85.22	8.15	
3028		-84.91	8.14	
3029		-81.83	8.08	
3030		-82.10	8.09	
3031		-83.02	8.11	
3032		-84.67	8.13	
3033		-84.83	8.14	
3034		-84.53	8.13	
3035		-84.16	8.12	
3036		-84.97	8.14	
3037		-85.25	8.14	
3038		-86.21	8.16	
3039		-85.71	8.15	
3040		-85.07	8.14	
3041		-84.21	8.12	
3042		-79.52	8.04	
3043		-77.63	8.01	
3044		-59.27	7.68	
3045		-65.61	7.79	
3046		-76.21	7.98	
3047		-81.85	8.08	
3048		-82.57	8.10	
3049		-83.63	8.11	

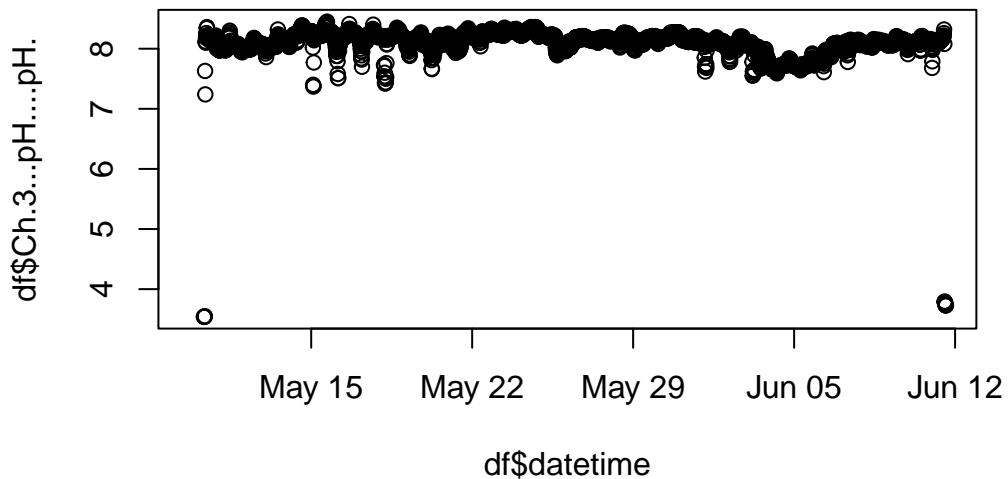
3050	-84.02	8.12
3051	-83.58	8.11
3052	-83.14	8.11
3053	-82.85	8.10
3054	-83.10	8.11
3055	-83.86	8.12
3056	-83.32	8.11
3057	-83.85	8.12
3058	-83.83	8.12
3059	-84.47	8.13
3060	-84.75	8.14
3061	-84.58	8.13
3062	-84.08	8.12
3063	-83.55	8.11
3064	-83.11	8.11
3065	-82.50	8.10
3066	-83.16	8.11
3067	-82.24	8.09
3068	-82.36	8.09
3069	-82.92	8.10
3070	-83.60	8.12
3071	-83.21	8.11
3072	-82.69	8.10
3073	-83.38	8.11
3074	-83.24	8.11
3075	-83.74	8.12
3076	-84.02	8.12
3077	-84.49	8.13
3078	-83.80	8.12
3079	-84.66	8.13
3080	-84.99	8.14
3081	-85.83	8.15
3082	-85.99	8.16
3083	-85.72	8.15
3084	-85.58	8.15
3085	-85.89	8.15
3086	-86.46	8.16
3087	-87.27	8.18
3088	-87.22	8.17
3089	-87.58	8.18
3090	-88.47	8.19
3091	-89.17	8.20
3092	-90.44	8.22

3093	-93.13	8.26	
3094	-96.67	8.32	
3095	-83.22	8.08	
3096	164.54	3.79	
3097	164.21	3.79	
3098	164.32	3.78	
3099	164.46	3.76	
3100	166.18	3.73	
3101	166.46	3.73	
3102	166.85	3.73	
3103	NA	NA	Logged
3104	NA	NA	Logged
3105	NA	NA	
Host.Connected End.of.File			
3026			
3027			
3028			
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3031			
3032			
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3097

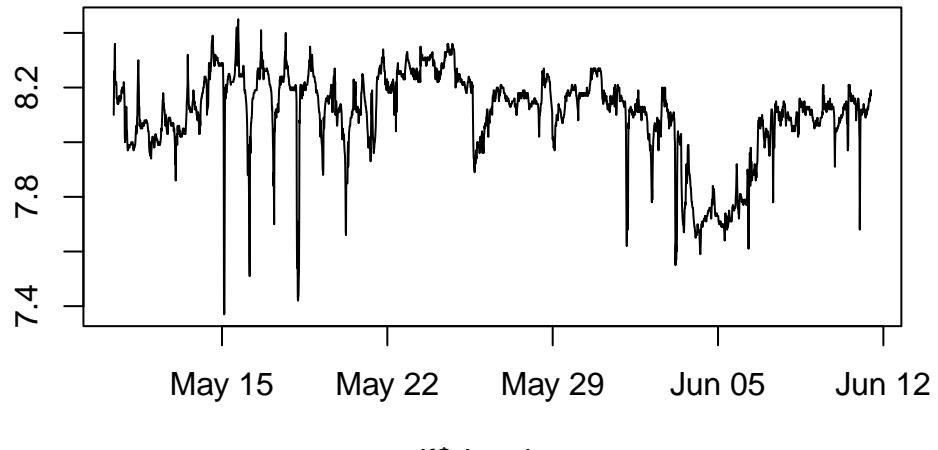
```
3098  
3099  
3100  
3101  
3102  
3103  
3104  
3105        Logged        Logged
```

```
df$datetime <- as.POSIXct(strptime(df$Date.Time..EDT., format = "%m/%d/%Y %H:%M")) #Switch
```



```
df <- df[df$datetime > "2023-05-10 09:45:00",]  
df <- df[df$datetime < "2023-06-11 11:45:00",]  
plot(df$datetime, df$Ch.3...pH....pH., type = "l")
```

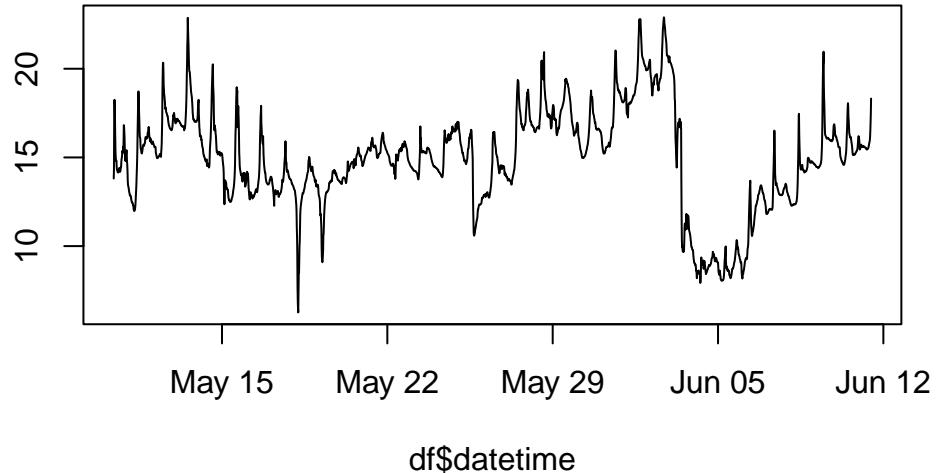
df\$Ch.3...pH....pH.



df\$datetime

```
plot(df$datetime, df$Ch.1...Temperature.....C., type = "l")
```

df\$Ch.1...Temperature....C.

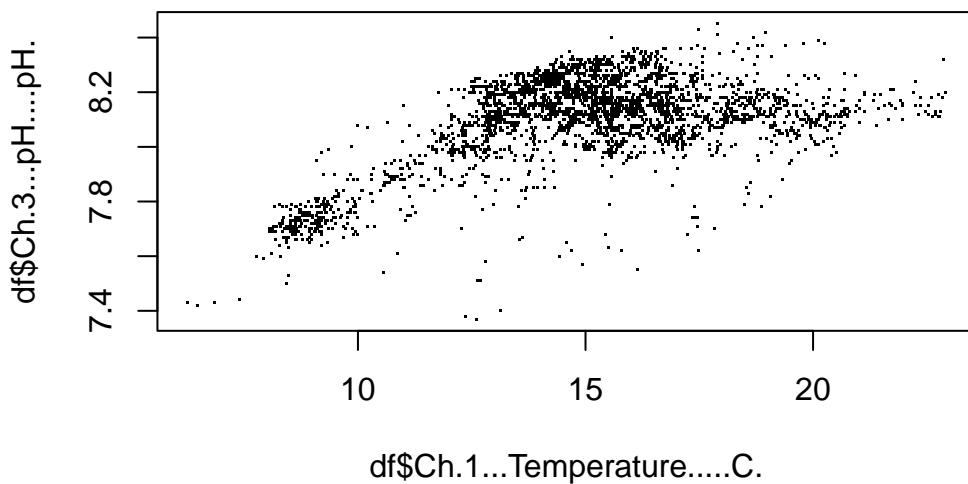


df\$datetime

```
length(df$Ch.1...Temperature.....C.)
```

```
[1] 0
```

```
plot(df$Ch.1...Temperature.....C., df$Ch.3...pH....pH., pch = '.')
```



```
#Metadata
SN <- 340
tris <- 8.19
tris_temp <- 21.3

data_combined_new <- data.frame(
  Site = rep("Ptown",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch.1...Temperature.....C.,
  pH = df$Ch.3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)
```

```
data_combined <- rbind(data_combined,data_combined_new)
```

### 0.1.3 Eel Pond

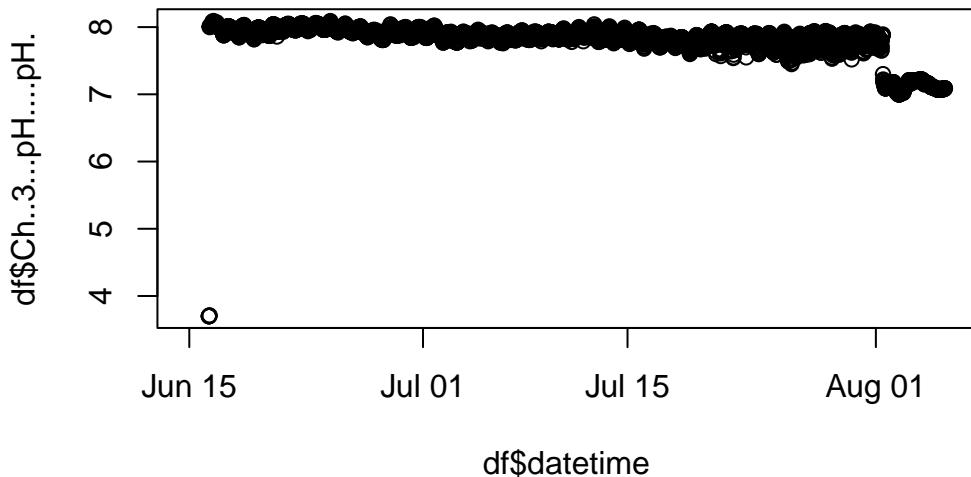
```
setwd(wdEel)
filenames <- dir()
filenames
```

```
[1] "20573560_Ptown 2022-12-05 16_55_15 EST (Data EST)_actuallyEel.csv"
[2] "20573560_Ptown 2022-12-05 16_55_15 EST (Data EST)_actuallyEel.csv.orig"
[3] "21333340_Eel_Pond 2022-06-13 08_27_36 EDT (Data EDT).csv"
[4] "21333340_Eel_Pond 2022-06-13 08_27_36 EDT (Data EDT).csv.orig"
[5] "21333340_Eel_Pond 2022-08-05 17_43_02 EDT (Data EDT).csv"
[6] "21333340_Eel_Pond 2022-08-05 17_43_02 EDT (Data EDT).csv.orig"
[7] "21333340_Eel_Pond 2022-09-11 18_27_18 EDT (Data EDT).csv"
[8] "21333340_Eel_Pond 2022-09-11 18_27_18 EDT (Data EDT).csv.orig"
[9] "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv"
[10] "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv.orig"
[11] "21333340_Eel_Pond 2023-04-14 15_22_46 EDT (Data EDT)(1).csv"
[12] "21333340_Eel_Pond 2023-05-08 09_10_54 EDT (Data EDT).csv"
[13] "21333340_Eel_Pond 2023-05-08 09_10_54 EDT (Data EDT).csv.orig"
[14] "Eel_076 2022-09-27 13_35_57 EDT (Data EDT).csv"
[15] "Eel_076 2022-09-27 13_35_57 EDT (Data EDT).csv.orig"
[16] "Eel_076 2022-11-07 09_15_44 EST (Data EST).xlsx"
[17] "Eel_076 2022-11-07 09_15_44 EST (Data EST).xlsx.orig"
[18] "Eel_076 2022-11-07 15_16_01 EST (Data EST)(1).csv"
[19] "Eel_076 2022-11-07 15_16_01 EST (Data EST)(1).csv.orig"
[20] "Eel_076 2023-06-11 14_39_04 EDT (Data EDT).csv"
```

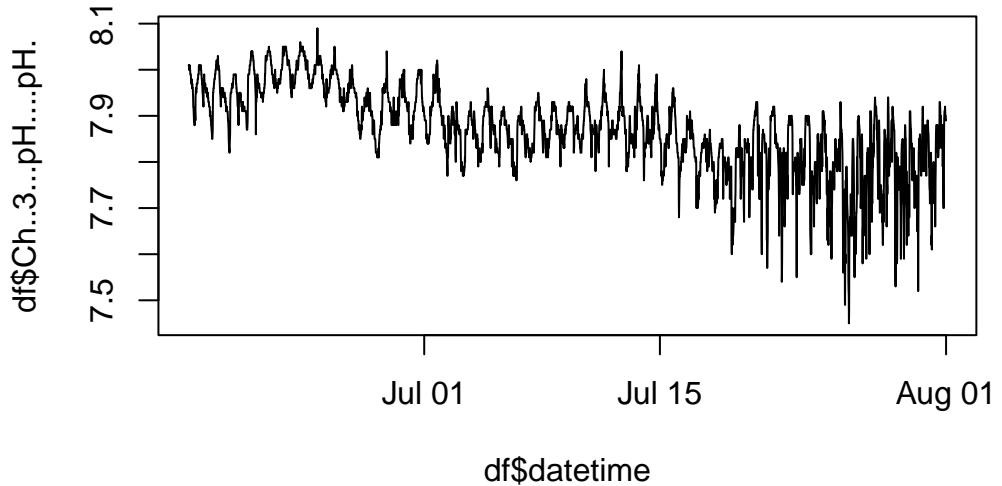
```
setwd(wdEel)
#mid June to Aug
#(open_file <- filenames[2])
(open_file <- "21333340_Eel_Pond 2022-08-05 17_43_02 EDT (Data EDT).csv")
```

```
[1] "21333340_Eel_Pond 2022-08-05 17_43_02 EDT (Data EDT).csv"
```

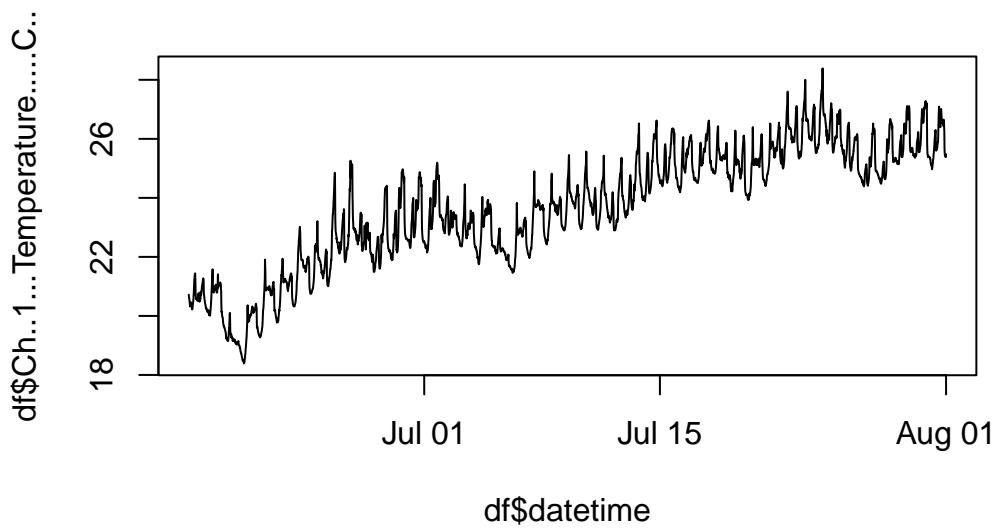
```
df <- read.csv(open_file, stringsAsFactors = F)
df$datetime <- as.POSIXct(strptime(df>Date.Time..EDT., format = "%m/%d/%Y %H:%M:%S"))
plot(df$datetime, df$Ch..3...pH....pH.)
```



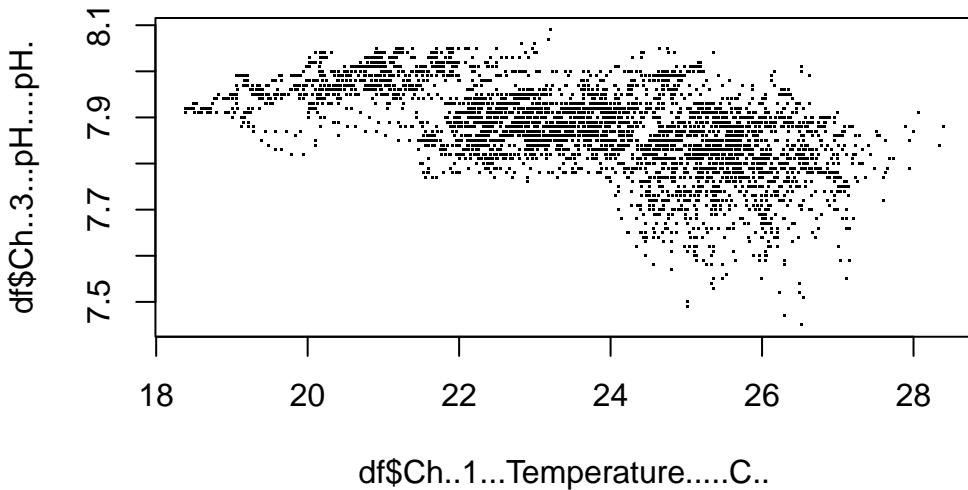
```
df <- df [df$datetime<"2022-08-01 00:09:00 EDT",]
df <- df [df$datetime>"2022-06-17 00:00:00 EDT",]
plot(df$datetime, df$Ch..3...pH....pH., type = "l")
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "l")
```



```
plot(df$Ch..1...Temperature.....C., df$Ch..3...pH....pH., pch = '.')
```



```
#Metadata
SN <- 340
tris <- 8.14
tris_temp <- 24.73

data_combined_new <- data.frame(
  Site = rep("Eel",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature.....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)
# Aug to lateAug is on logger that is still logging in Eel Pond and
# needs to be retrieved.
# There was an issue with the tool when swapping them out
```

```

setwd(wdEel)
#Aug to lateAug
(open_file <- filenames[4])

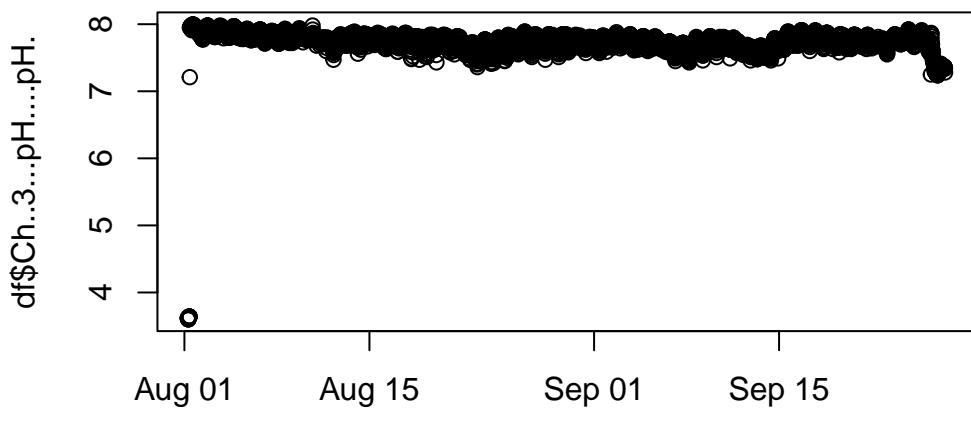
[1] "21333340_Eel_Pond 2022-06-13 08_27_36 EDT (Data EDT).csv.orig"

(open_file <- "Eel_076 2022-09-27 13_35_57 EDT (Data EDT).csv")

[1] "Eel_076 2022-09-27 13_35_57 EDT (Data EDT).csv"

df <- read.csv(open_file, stringsAsFactors = F)
df$datetime <- as.POSIXct(strptime(df$date.Time..EDT., format = "%m/%d/%Y %H:%M:%S"))
plot(df$datetime, df$Ch..3...pH....pH.)

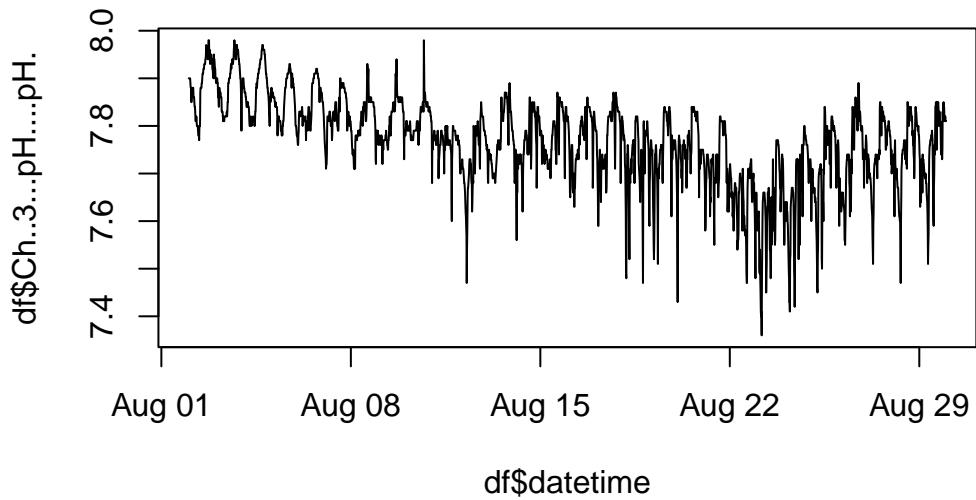
```



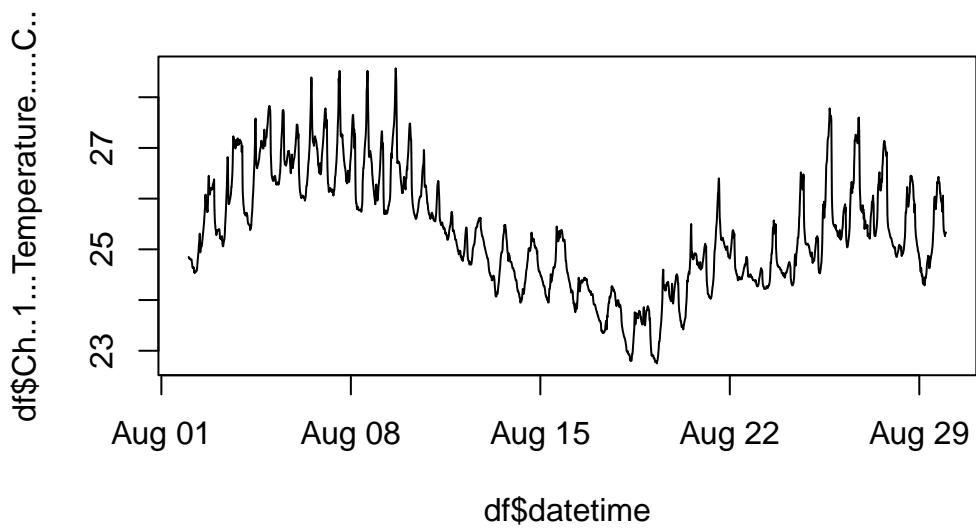
```

df <- df[df$datetime < "2022-08-30 00:00:00 EDT",]
df <- df[df$datetime > "2022-08-02 00:00:00 EDT",]
plot(df$datetime, df$Ch..3...pH....pH., type = "l")

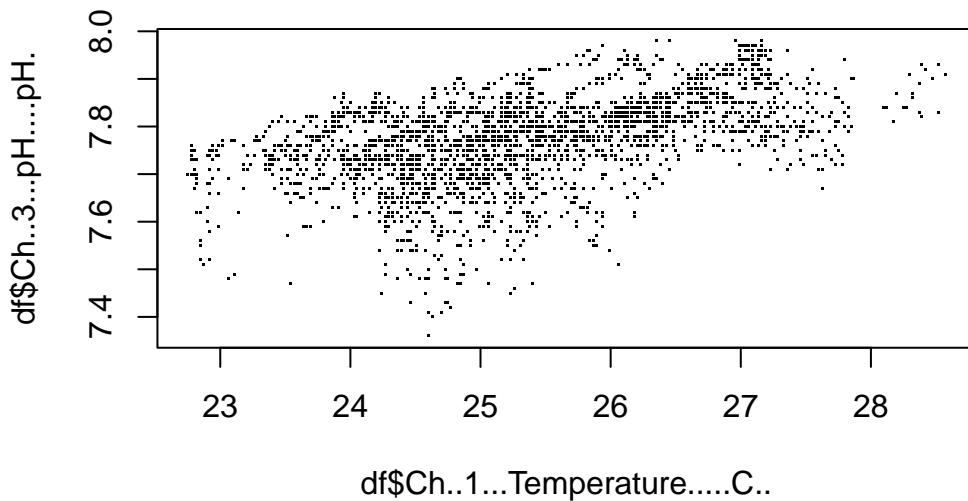
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "l")
```



```
plot(df$Ch..1...Temperature.....C., df$Ch..3...pH....pH., pch = '.')
```



```
#Metadata
SN <- 076
tris <- 8.15
tris_temp <- 24.85

data_combined_new <- data.frame(
  Site = rep("Eel",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature.....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)
# Aug to lateAug is on logger that is still logging in Eel Pond and
# needs to be retrieved.
# There was an issue with the tool when swapping them out
```

```

# # lateAug to mid Sep (was still logging and deployed -
# # but lost ~14 days of data due to calibrating before downloading data)
# (open_file <- filenames[3])
# open_file <- "21333340_Eel_Pond 2022-09-11 18_27_18 EDT (Data EDT).csv"
#
# df <- read.csv(open_file, stringsAsFactors = F)
# df$datetime <- as.POSIXct(strptime(df$date.Time..EDT., format = "%m/%d/%Y %H:%M:%S"))
# plot(df$datetime, df$Ch..3...pH....pH.)
# df <- df[df$datetime>"2022-08-31 00:00:00 EDT",]
# df <- df[df$datetime<"2022-09-11 00:00:00 EDT",]
# plot(df$datetime, df$Ch..3...pH....pH., type = "l")
# plot(df$datetime, df$Ch..1...Temperature.....C.., type = "l")
# plot(df$Ch..1...Temperature.....C.., df$Ch..3...pH....pH., pch = '.')
#
# data_combined_new <- data.frame(
#   Site = rep("Eel",times = nrow(df)),
#   Date = df$datetime,
#   Temp = df$Ch..1...Temperature.....C..,
#   pH = df$Ch..3...pH....pH.
# )
#
#
# data_combined <- rbind(data_combined,data_combined_new)

setwd(wdEel)
# #October???
# #October is not clear.
# #If the other logger was still logging and deployed at this site
# (open_file <- filenames[3])
# open_file <- "Eel_076 2022-11-07 15_16_01 EST (Data EST)(1).csv"
# head(df, 20)
# df <- read.csv(open_file, stringsAsFactors = F)
# df$datetime <- as.POSIXct(strptime(df$date.Time..EST., format = "%m/%d/%Y %H:%M:%S")) #O
# plot(df$datetime, df$Ch..3...pH....pH.)
# df <- df[df$datetime>"2022-09-25 00:00:00 EDT",]
# # df <- df[df$datetime<"2022-09-30 00:00:00 EDT",]
#
# #df <- df[df$datetime<"2022-08-31 00:00:00 EDT",]
# #df <- df[df$datetime>"2022-08-26 00:00:00 EDT",]

```

```

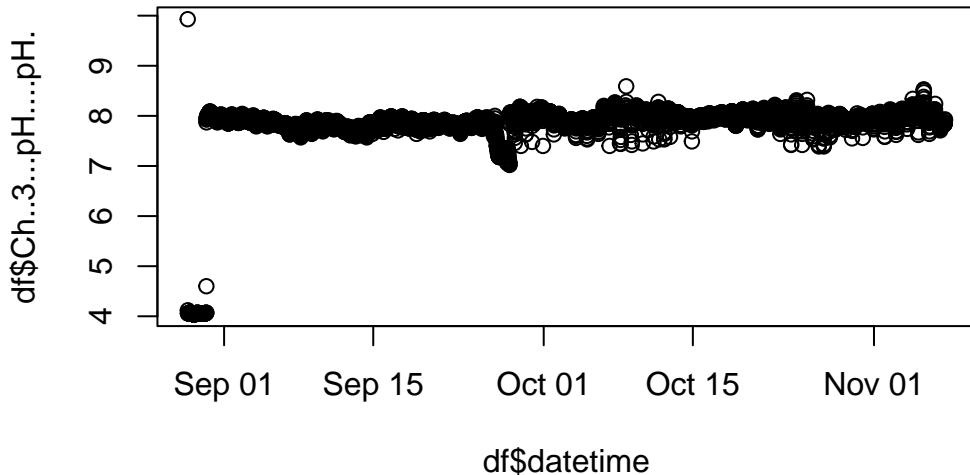
# plot(df$datetime, df$Ch..3...pH....pH., type = "l")
# plot(df$datetime, df$Ch..1...Temperature.....C.., type = "p")
# plot(df$Ch..1...Temperature.....C.., df$Ch..3...pH....pH., pch = '.')
#
# data_combined_new <- data.frame(
#   Site = rep("Eel",times = nrow(df)),
#   Date = df$datetime,
#   Temp = df$Ch..1...Temperature.....C..,
#   pH = df$Ch..3...pH....pH.
# )
#
#
# data_combined <- rbind(data_combined,data_combined_new)

# October
# This sensor seems to be deployed at Eel pond originally, recalibrated without a change in
# and then moved to Ptown. The segment at Eel Pond ends on Monday 9/26/22.
# It was deployed on 8/31/22. Which is a day we were at Eel Pond
filenames

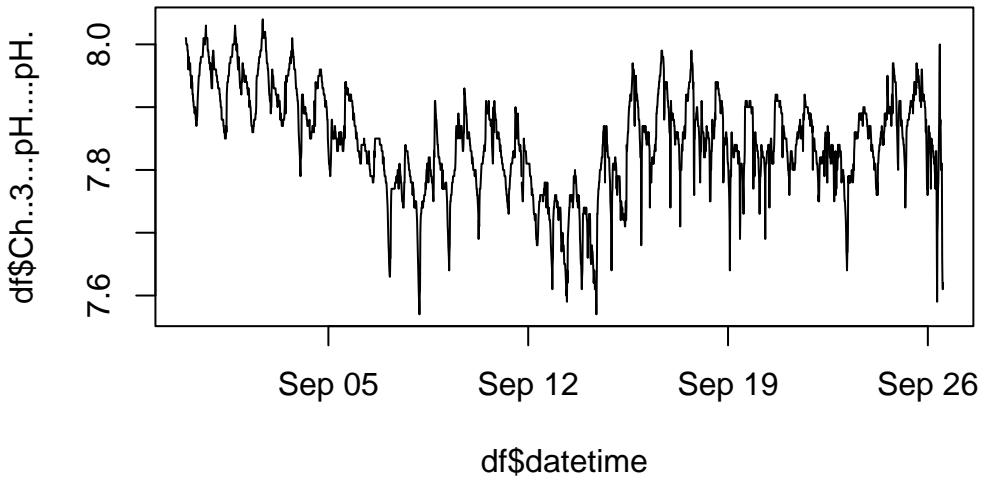
[1] "20573560_Ptown 2022-12-05 16_55_15 EST (Data EST)_actuallyEel.csv"
[2] "20573560_Ptown 2022-12-05 16_55_15 EST (Data EST)_actuallyEel.csv.orig"
[3] "21333340_Eel_Pond 2022-06-13 08_27_36 EDT (Data EDT).csv"
[4] "21333340_Eel_Pond 2022-06-13 08_27_36 EDT (Data EDT).csv.orig"
[5] "21333340_Eel_Pond 2022-08-05 17_43_02 EDT (Data EDT).csv"
[6] "21333340_Eel_Pond 2022-08-05 17_43_02 EDT (Data EDT).csv.orig"
[7] "21333340_Eel_Pond 2022-09-11 18_27_18 EDT (Data EDT).csv"
[8] "21333340_Eel_Pond 2022-09-11 18_27_18 EDT (Data EDT).csv.orig"
[9] "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv"
[10] "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv.orig"
[11] "21333340_Eel_Pond 2023-04-14 15_22_46 EDT (Data EDT)(1).csv"
[12] "21333340_Eel_Pond 2023-05-08 09_10_54 EDT (Data EDT).csv"
[13] "21333340_Eel_Pond 2023-05-08 09_10_54 EDT (Data EDT).csv.orig"
[14] "Eel_076 2022-09-27 13_35_57 EDT (Data EDT).csv"
[15] "Eel_076 2022-09-27 13_35_57 EDT (Data EDT).csv.orig"
[16] "Eel_076 2022-11-07 09_15_44 EST (Data EST).xlsx"
[17] "Eel_076 2022-11-07 09_15_44 EST (Data EST).xlsx.orig"
[18] "Eel_076 2022-11-07 15_16_01 EST (Data EST)(1).csv"
[19] "Eel_076 2022-11-07 15_16_01 EST (Data EST)(1).csv.orig"
[20] "Eel_076 2023-06-11 14_39_04 EDT (Data EDT).csv"

```

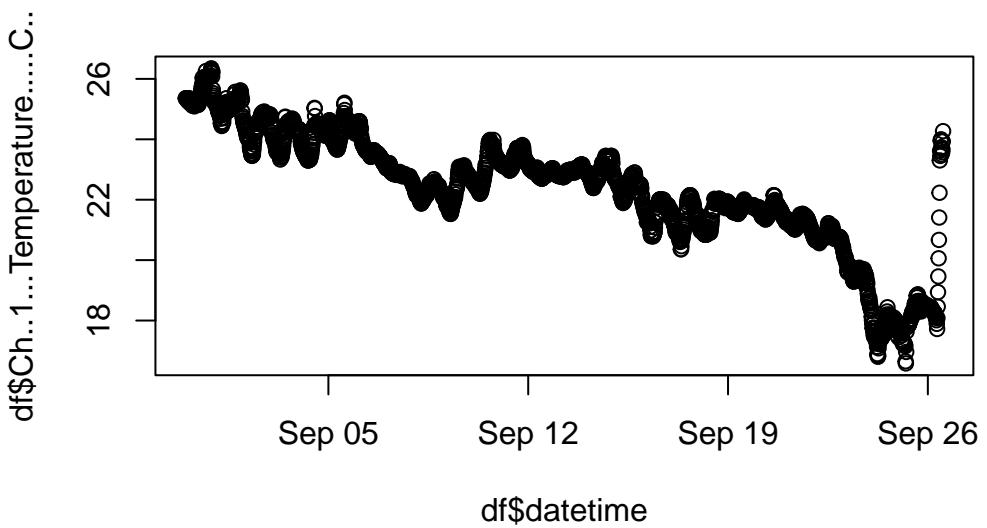
```
open_file <- "21333340_Eel_Pond 2022-11-07 15_11_16 EST (Data EST)_actuallyPtown.csv"
df <- read.csv(open_file, stringsAsFactors = F)
df$datetime <- as.POSIXct(strptime(df$date.Time..EST., format = "%m/%d/%Y %H:%M:%S")) #Swi
plot(df$datetime, df$Ch..3...pH....pH.)
```



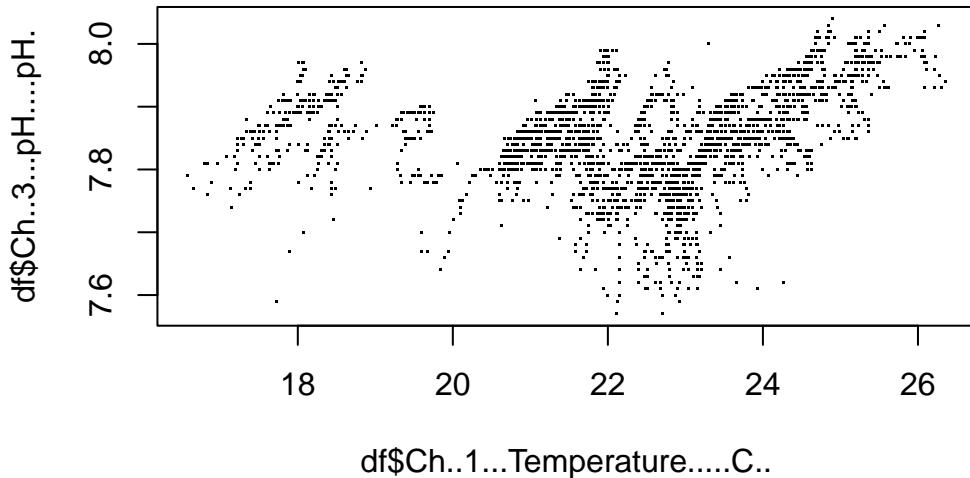
```
# df <- df[df$datetime>"2022-09-25 00:00:00 EDT",]
# df <- df[df$datetime<"2022-09-29 13:00:00 EDT",]
df <- df[df$datetime>"2022-08-31 00:00:00 EDT",]
df <- df[df$datetime<"2022-09-26 13:00:00 EDT",]
plot(df$datetime, df$Ch..3...pH....pH., type = "l")
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "p")
```



```
plot(df$Ch..1...Temperature.....C., df$Ch..3...pH....pH., pch = '.')
```



```
#Metadata
SN <- 340
tris <- 8.18
tris_temp <- 24.73

data_combined_new <- data.frame(
  Site = rep("Eel",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature.....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)
data_combined <- rbind(data_combined,data_combined_new)
```

```

setwd(wdEel)
# Early October
#(open_file <- filenames[3])
open_file <- "Eel_076 2022-11-07 15_16_01 EST (Data EST)(1).csv"
head(df, 20)

```

	X. Date.Time..EST.EDT. Ch..1...Temperature.....C..	Ch..2...Millivolts....mv. Ch..3...pH....pH. Button.Down Button.Up
236	236 08/31/2022 00:03:02	25.36
237	237 08/31/2022 00:18:02	25.36
238	238 08/31/2022 00:33:02	25.33
239	239 08/31/2022 00:48:02	25.36
240	240 08/31/2022 01:03:02	25.36
241	241 08/31/2022 01:18:02	25.33
242	242 08/31/2022 01:33:02	25.28
243	243 08/31/2022 01:48:02	25.31
244	244 08/31/2022 02:03:02	25.26
245	245 08/31/2022 02:18:02	25.36
246	246 08/31/2022 02:33:02	25.33
247	247 08/31/2022 02:48:02	25.36
248	248 08/31/2022 03:03:02	25.23
249	249 08/31/2022 03:18:02	25.21
250	250 08/31/2022 03:33:02	25.21
251	251 08/31/2022 03:48:02	25.21
252	252 08/31/2022 04:03:02	25.21
253	253 08/31/2022 04:18:02	25.19
254	254 08/31/2022 04:33:02	25.19
255	255 08/31/2022 04:48:02	25.16
		Ch..2...Millivolts....mv. Ch..3...pH....pH. Button.Down Button.Up
236	-69.21	8.01
237	-69.19	8.01
238	-68.96	8.00
239	-68.94	8.00
240	-68.55	8.00
241	-68.39	8.00
242	-68.25	7.99
243	-68.05	7.99
244	-67.47	7.98
245	-66.60	7.96
246	-67.31	7.98
247	-67.22	7.97
248	-66.75	7.97
249	-66.53	7.96

250	-66.77	7.97
251	-66.72	7.97
252	-65.96	7.95
253	-65.75	7.95
254	-65.58	7.95
255	-64.85	7.93

Host.Connected Start.pH.Calibration pH.Calibration.Values

236

237

238

239

240

241

242

243

244

245

246

247

248

249

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251

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253

254

255

pH.Calibration.Buffers End.pH.Calibration Stopped End.of.File

236

237

238

239

240

241

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243

244

245

246

247

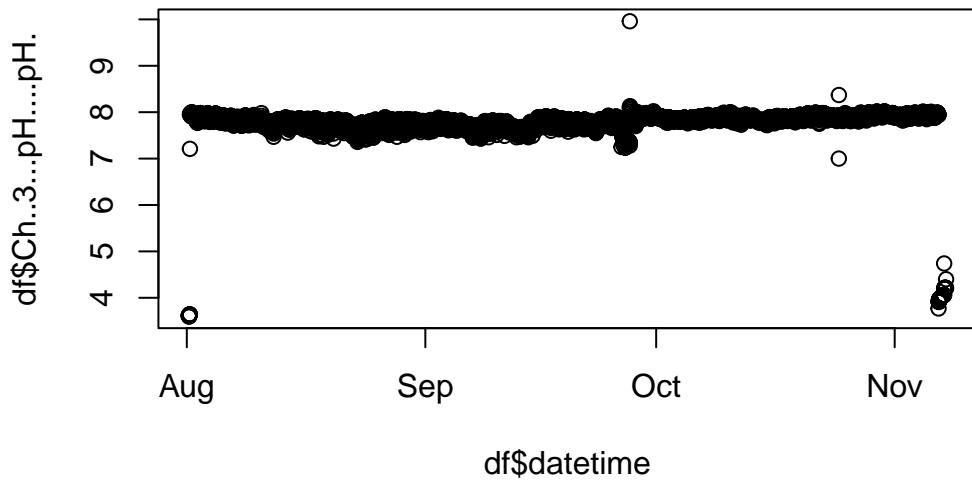
248

249

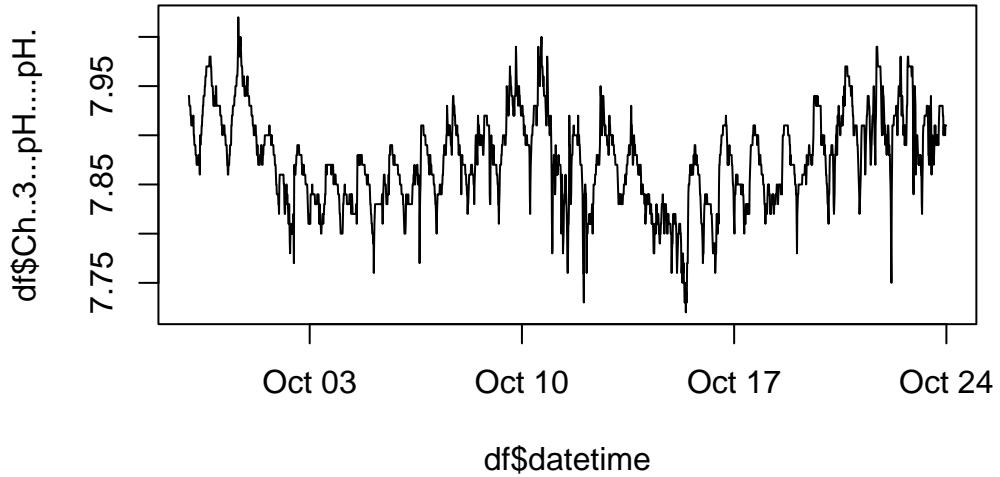
250

```
251  
252  
253  
254  
255  
      datetime  
236 2022-08-31 00:03:02  
237 2022-08-31 00:18:02  
238 2022-08-31 00:33:02  
239 2022-08-31 00:48:02  
240 2022-08-31 01:03:02  
241 2022-08-31 01:18:02  
242 2022-08-31 01:33:02  
243 2022-08-31 01:48:02  
244 2022-08-31 02:03:02  
245 2022-08-31 02:18:02  
246 2022-08-31 02:33:02  
247 2022-08-31 02:48:02  
248 2022-08-31 03:03:02  
249 2022-08-31 03:18:02  
250 2022-08-31 03:33:02  
251 2022-08-31 03:48:02  
252 2022-08-31 04:03:02  
253 2022-08-31 04:18:02  
254 2022-08-31 04:33:02  
255 2022-08-31 04:48:02
```

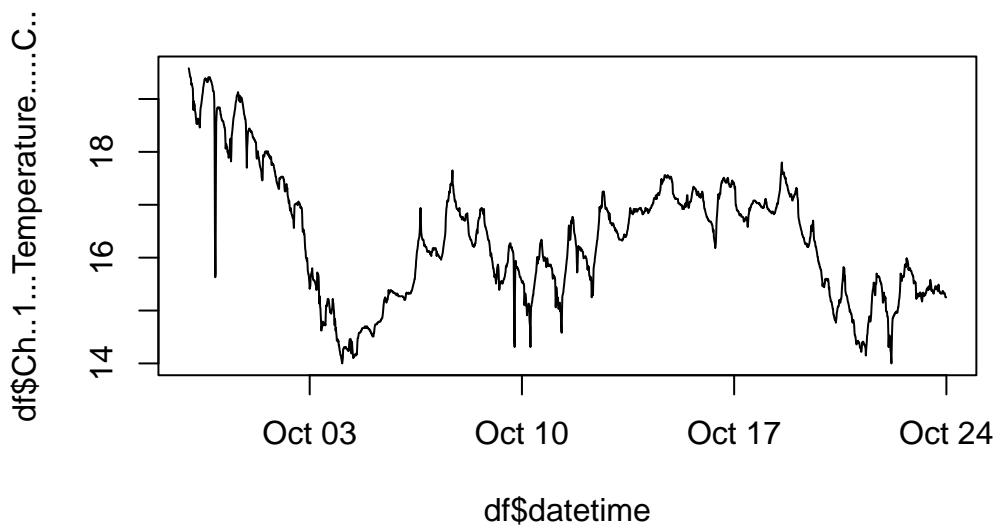
```
df <- read.csv(open_file, stringsAsFactors = F)  
df$datetime <- as.POSIXct(strptime(df$Date.Time..EST., format = "%m/%d/%Y %H:%M:%S")) #Change  
plot(df$datetime, df$Ch..3...pH....pH.)
```



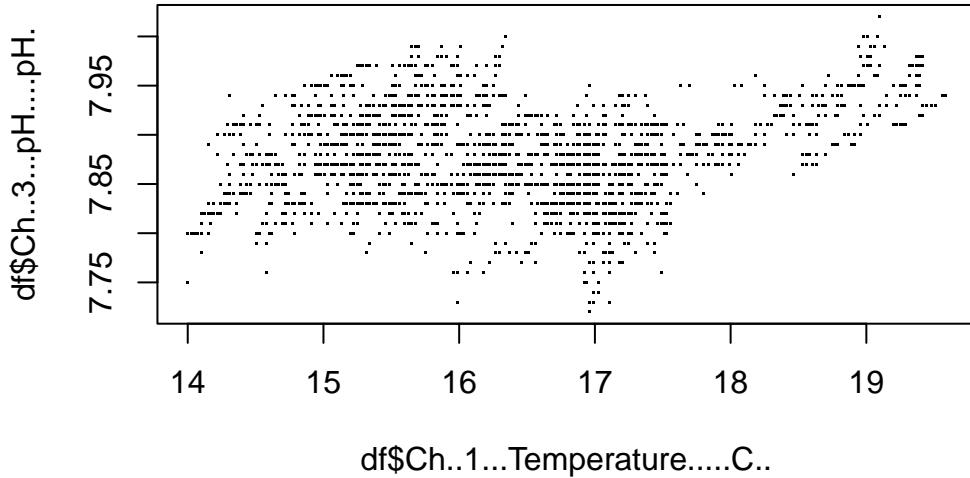
```
df <- df[df$datetime>"2022-09-29 00:00:00 EDT",]  
df <- df[df$datetime<"2022-10-24 00:00:00 EDT",]  
#df <- df[df$datetime<"2022-11-06 00:00:00 EDT",]  
plot(df$datetime, df$Ch..3...pH....pH., type = "l")
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "l")
```



```
plot(df$Ch..1...Temperature.....C., df$Ch..3...pH....pH., pch = '.')
```



```
#Metadata
SN <- 076
tris <- NA
tris_temp <- NA

data_combined_new <- data.frame(
  Site = rep("Eel",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature.....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)
```

```

setwd(wdEel)
# late October
#(open_file <- filenames[3])
open_file <- "Eel_076 2022-11-07 15_16_01 EST (Data EST)(1).csv"
head(df, 20)

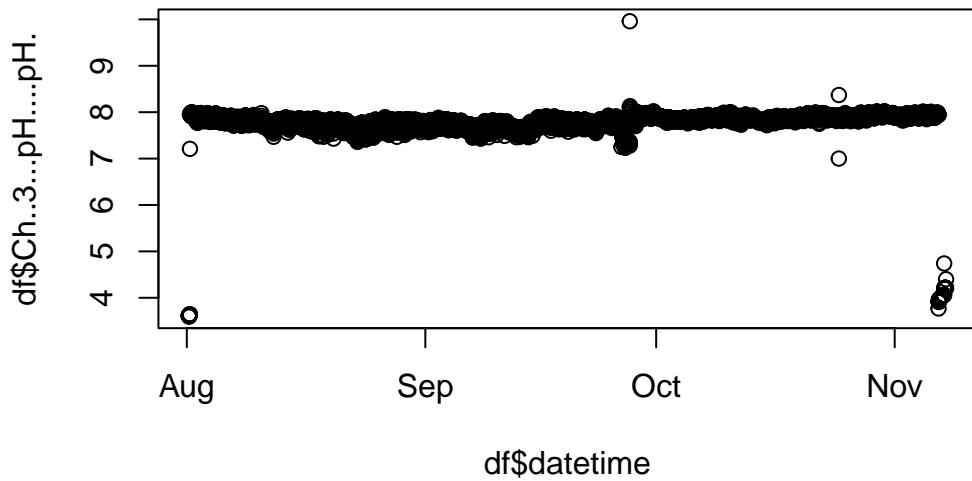
```

	X. Date.Time..EST.EDT.	Ch..1...Temperature.....C..
5649	5649 09/29/2022 00:15:00	19.58
5650	5650 09/29/2022 00:30:00	19.56
5651	5651 09/29/2022 00:45:00	19.51
5652	5652 09/29/2022 01:00:00	19.48
5653	5653 09/29/2022 01:15:00	19.44
5654	5654 09/29/2022 01:30:00	19.41
5655	5655 09/29/2022 01:45:00	19.41
5656	5656 09/29/2022 02:00:00	19.39
5657	5657 09/29/2022 02:15:00	19.27
5658	5658 09/29/2022 02:30:00	19.29
5659	5659 09/29/2022 02:45:00	19.29
5660	5660 09/29/2022 03:00:00	19.25
5661	5661 09/29/2022 03:15:00	19.22
5662	5662 09/29/2022 03:30:00	19.20
5663	5663 09/29/2022 03:45:00	18.98
5664	5664 09/29/2022 04:00:00	18.79
5665	5665 09/29/2022 04:15:00	18.96
5666	5666 09/29/2022 04:30:00	18.91
5667	5667 09/29/2022 04:45:00	18.91
5668	5668 09/29/2022 05:00:00	18.89
	Ch..2...Millivolts....mv.	Ch..3...pH....pH. Button.Down Button.Up
5649	-62.19	7.94
5650	-61.97	7.94
5651	-61.81	7.93
5652	-61.56	7.93
5653	-61.56	7.93
5654	-61.50	7.93
5655	-61.30	7.92
5656	-60.91	7.92
5657	-60.49	7.91
5658	-60.61	7.91
5659	-60.67	7.91
5660	-60.66	7.91
5661	-60.64	7.91
5662	-60.20	7.91

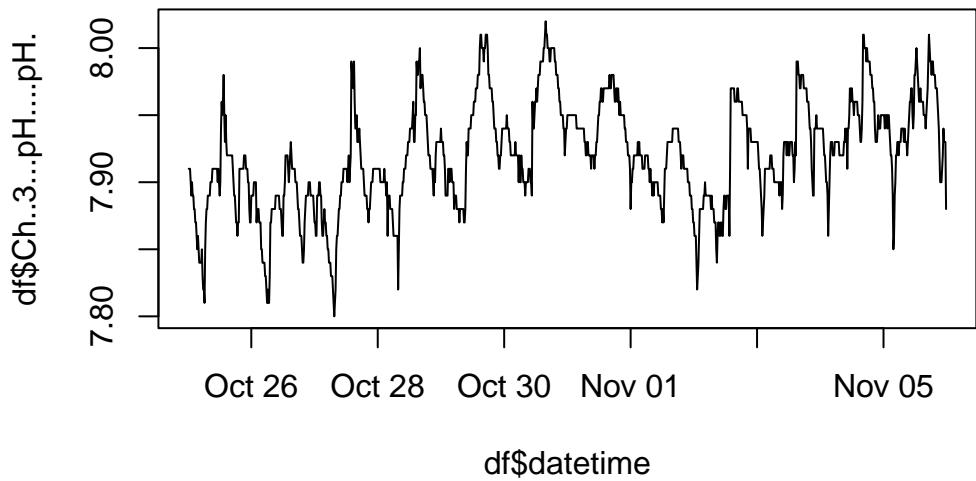
5663	-60.78	7.92
5664	-60.92	7.92
5665	-59.92	7.90
5666	-59.64	7.90
5667	-59.28	7.89
5668	-59.06	7.89
	Host.Connected Start.pH.Calibration pH.Calibration.Values	
5649		
5650		
5651		
5652		
5653		
5654		
5655		
5656		
5657		
5658		
5659		
5660		
5661		
5662		
5663		
5664		
5665		
5666		
5667		
5668		
	pH.Calibration.Buffers End.pH.Calibration Cancel.pH.Calibration	
5649		
5650		
5651		
5652		
5653		
5654		
5655		
5656		
5657		
5658		
5659		
5660		
5661		
5662		
5663		

```
5664
5665
5666
5667
5668
      End.of.File      datetime
5649          2022-09-29 00:15:00
5650          2022-09-29 00:30:00
5651          2022-09-29 00:45:00
5652          2022-09-29 01:00:00
5653          2022-09-29 01:15:00
5654          2022-09-29 01:30:00
5655          2022-09-29 01:45:00
5656          2022-09-29 02:00:00
5657          2022-09-29 02:15:00
5658          2022-09-29 02:30:00
5659          2022-09-29 02:45:00
5660          2022-09-29 03:00:00
5661          2022-09-29 03:15:00
5662          2022-09-29 03:30:00
5663          2022-09-29 03:45:00
5664          2022-09-29 04:00:00
5665          2022-09-29 04:15:00
5666          2022-09-29 04:30:00
5667          2022-09-29 04:45:00
5668          2022-09-29 05:00:00
```

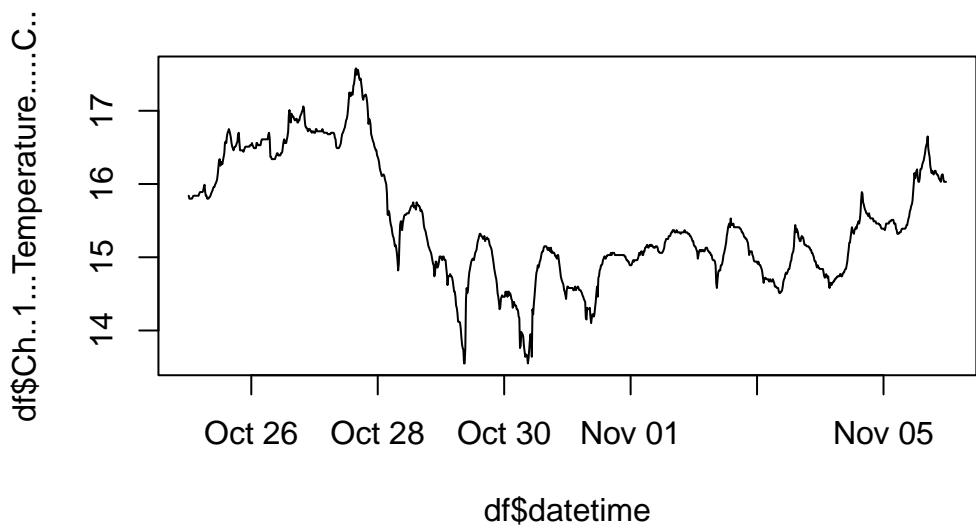
```
df <- read.csv(open_file, stringsAsFactors = F)
df$datetime <- as.POSIXct(strptime(df$Date.Time..EST., format = "%m/%d/%Y %H:%M:%S")) #Change
plot(df$datetime, df$Ch..3...pH....pH.)
```



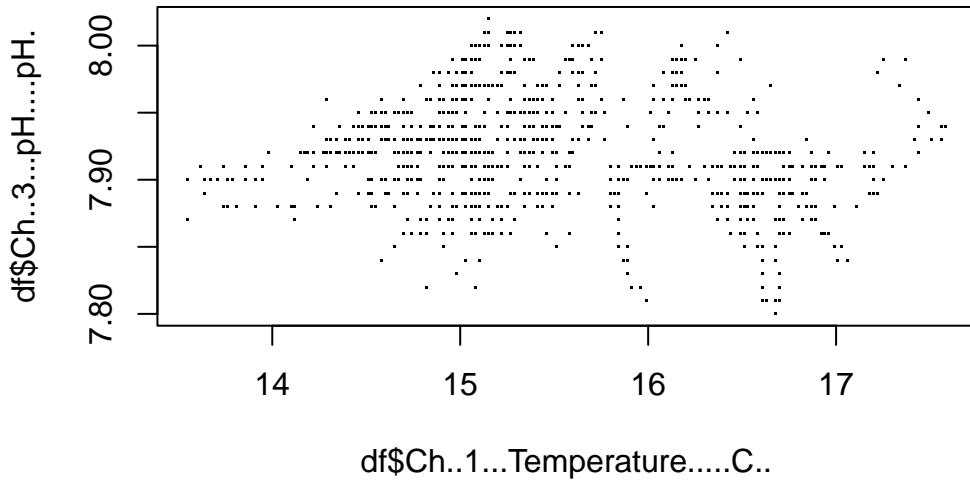
```
#df <- df[df$datetime>"2022-09-29 00:00:00 EDT",]
df <- df[df$datetime>"2022-10-25 00:00:00 EDT",]
df <- df[df$datetime<"2022-11-06 00:00:00 EDT",]
plot(df$datetime, df$Ch..3...pH....pH., type = "l")
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "l")
```



```
plot(df$Ch..1...Temperature.....C., df$Ch..3...pH....pH., pch = '.')
```



```
#Metadata
SN <- 076
tris <- 8.38
tris_temp <- 16.13

data_combined_new <- data.frame(
  Site = rep("Eel",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature.....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)
data_combined <- rbind(data_combined,data_combined_new)
```

```

setwd(wdPtown)
# November
# This last file seems a bit out of place. However, I can confirm that this is Provincetow

#I need to revisit this because the way I explained it above, the pH's don't match with th

open_file <- "Ptown_076 2022-12-05 21_20_00 EST (Data EST).csv"
df <- read.csv(open_file, stringsAsFactors = F)
head(df)

```

	X.	Date.Time..EST.	Ch..1...Temperature.....C..	Ch..2...Millivolts....mv.
1	1	11/07/2022 15:30:00	17.22	-74.78
2	2	11/07/2022 15:45:00	16.80	-80.85
3	3	11/07/2022 16:00:00	16.51	-83.35
4	4	11/07/2022 16:15:00	16.03	-83.33
5	5	11/07/2022 16:30:00	15.75	-80.56
6	6	11/07/2022 16:45:00	15.25	-70.85
		Ch..3...pH....pH.	Button.Down Button.Up Host.Connected End.of.File	
1		8.23		
2		8.34		
3		8.39		
4		8.39		
5		8.34		
6		8.17		

```
tail(df,80)
```

	X.	Date.Time..EST.	Ch..1...Temperature.....C..
2637	2637	12/05/2022 02:30:00	17.68
2638	2638	12/05/2022 02:45:00	17.75
2639	2639	12/05/2022 03:00:00	17.84
2640	2640	12/05/2022 03:15:00	17.91
2641	2641	12/05/2022 03:30:00	17.99
2642	2642	12/05/2022 03:45:00	18.06
2643	2643	12/05/2022 04:00:00	18.15
2644	2644	12/05/2022 04:15:00	18.22
2645	2645	12/05/2022 04:30:00	18.30
2646	2646	12/05/2022 04:45:00	18.37
2647	2647	12/05/2022 05:00:00	18.46
2648	2648	12/05/2022 05:15:00	18.53

2649	2649	12/05/2022	05:30:00	18.60
2650	2650	12/05/2022	05:45:00	18.68
2651	2651	12/05/2022	06:00:00	18.75
2652	2652	12/05/2022	06:15:00	18.79
2653	2653	12/05/2022	06:30:00	18.87
2654	2654	12/05/2022	06:45:00	18.91
2655	2655	12/05/2022	07:00:00	18.96
2656	2656	12/05/2022	07:15:00	19.01
2657	2657	12/05/2022	07:30:00	19.03
2658	2658	12/05/2022	07:45:00	19.08
2659	2659	12/05/2022	08:00:00	19.13
2660	2660	12/05/2022	08:15:00	19.15
2661	2661	12/05/2022	08:30:00	19.20
2662	2662	12/05/2022	08:45:00	19.22
2663	2663	12/05/2022	09:00:00	19.25
2664	2664	12/05/2022	09:15:00	19.29
2665	2665	12/05/2022	09:30:00	19.32
2666	2666	12/05/2022	09:45:00	19.37
2667	2667	12/05/2022	10:00:00	19.41
2668	2668	12/05/2022	10:15:00	19.34
2669	2669	12/05/2022	10:30:00	19.32
2670	2670	12/05/2022	10:45:00	19.22
2671	2671	12/05/2022	11:00:00	18.84
2672	2672	12/05/2022	11:15:00	18.58
2673	2673	12/05/2022	11:30:00	18.51
2674	2674	12/05/2022	11:45:00	18.53
2675	2675	12/05/2022	12:00:00	18.58
2676	2676	12/05/2022	12:15:00	18.68
2677	2677	12/05/2022	12:30:00	18.10
2678	2678	12/05/2022	12:45:00	17.15
2679	2679	12/05/2022	13:00:00	16.13
2680	2680	12/05/2022	13:15:00	15.32
2681	2681	12/05/2022	13:30:00	14.53
2682	2682	12/05/2022	13:45:00	14.03
2683	2683	12/05/2022	14:00:00	14.22
2684	2684	12/05/2022	14:15:00	14.46
2685	2685	12/05/2022	14:30:00	14.74
2686	2686	12/05/2022	14:45:00	14.96
2687	2687	12/05/2022	15:00:00	15.10
2688	2688	12/05/2022	15:15:00	15.13
2689	2689	12/05/2022	15:30:00	15.03
2690	2690	12/05/2022	15:45:00	14.84
2691	2691	12/05/2022	16:00:00	14.58

2692	2692	12/05/2022	16:15:00		14.24
2693	2693	12/05/2022	16:30:00		13.83
2694	2694	12/05/2022	16:45:00		13.35
2695	2695	12/05/2022	17:00:00		12.61
2696	2696	12/05/2022	17:15:00		11.83
2697	2697	12/05/2022	17:30:00		11.95
2698	2698	12/05/2022	17:45:00		12.44
2699	2699	12/05/2022	18:00:00		12.92
2700	2700	12/05/2022	18:15:00		13.35
2701	2701	12/05/2022	18:30:00		13.88
2702	2702	12/05/2022	18:45:00		14.41
2703	2703	12/05/2022	19:00:00		14.86
2704	2704	12/05/2022	19:15:00		15.22
2705	2705	12/05/2022	19:30:00		15.41
2706	2706	12/05/2022	19:45:00		15.53
2707	2707	12/05/2022	20:00:00		15.70
2708	2708	12/05/2022	20:15:00		15.84
2709	2709	12/05/2022	20:30:00		15.89
2710	2710	12/05/2022	20:45:00		15.91
2711	2711	12/05/2022	21:00:00		15.72
2712	2712	12/05/2022	21:15:00		14.82
2713	2713	12/05/2022	21:18:54		NA
2714	2714	12/05/2022	21:18:55		NA
2715	2715	12/05/2022	21:18:56		NA
2716	2716	12/05/2022	21:19:50		NA
Ch..2....Millivolts....mv. Ch..3....pH....pH. Button.Down Button.Up					
2637			180.02		3.66
2638			180.05		3.66
2639			180.08		3.66
2640			180.10		3.66
2641			180.13		3.66
2642			180.15		3.66
2643			180.18		3.66
2644			180.21		3.66
2645			180.22		3.66
2646			180.26		3.66
2647			180.29		3.66
2648			180.32		3.66
2649			180.33		3.66
2650			180.36		3.67
2651			180.40		3.67
2652			180.41		3.67
2653			180.41		3.67

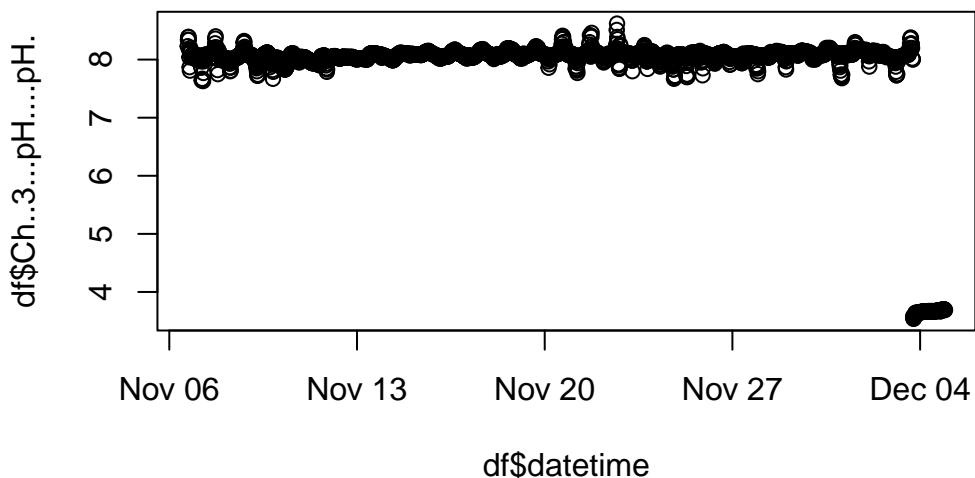
2654	180.43	3.67
2655	180.44	3.67
2656	180.44	3.67
2657	180.46	3.67
2658	180.46	3.67
2659	180.46	3.67
2660	180.46	3.67
2661	180.46	3.67
2662	180.47	3.67
2663	180.47	3.67
2664	180.47	3.67
2665	180.47	3.67
2666	180.49	3.67
2667	180.49	3.67
2668	180.47	3.67
2669	180.46	3.67
2670	180.40	3.67
2671	180.29	3.67
2672	180.26	3.67
2673	180.22	3.67
2674	180.16	3.67
2675	180.11	3.67
2676	180.10	3.67
2677	179.46	3.67
2678	178.94	3.67
2679	178.41	3.67
2680	177.91	3.67
2681	177.49	3.67
2682	177.11	3.67
2683	177.07	3.67
2684	177.07	3.68
2685	177.08	3.68
2686	177.08	3.68
2687	177.10	3.68
2688	177.08	3.68
2689	177.05	3.68
2690	176.99	3.68
2691	176.91	3.68
2692	176.79	3.68
2693	176.63	3.68
2694	176.44	3.67
2695	176.13	3.67
2696	175.86	3.67

2697	175.77	3.67
2698	175.76	3.68
2699	175.82	3.68
2700	175.88	3.68
2701	175.97	3.69
2702	176.11	3.69
2703	176.24	3.70
2704	176.40	3.70
2705	176.52	3.70
2706	176.63	3.70
2707	176.74	3.70
2708	176.83	3.70
2709	176.91	3.70
2710	176.93	3.70
2711	176.94	3.69
2712	176.63	3.69
2713	NA	NA
2714	NA	NA
2715	NA	NA
2716	NA	NA
Host.Connected End.of.File		
2637		
2638		
2639		
2640		
2641		
2642		
2643		
2644		
2645		
2646		
2647		
2648		
2649		
2650		
2651		
2652		
2653		
2654		
2655		
2656		
2657		
2658		

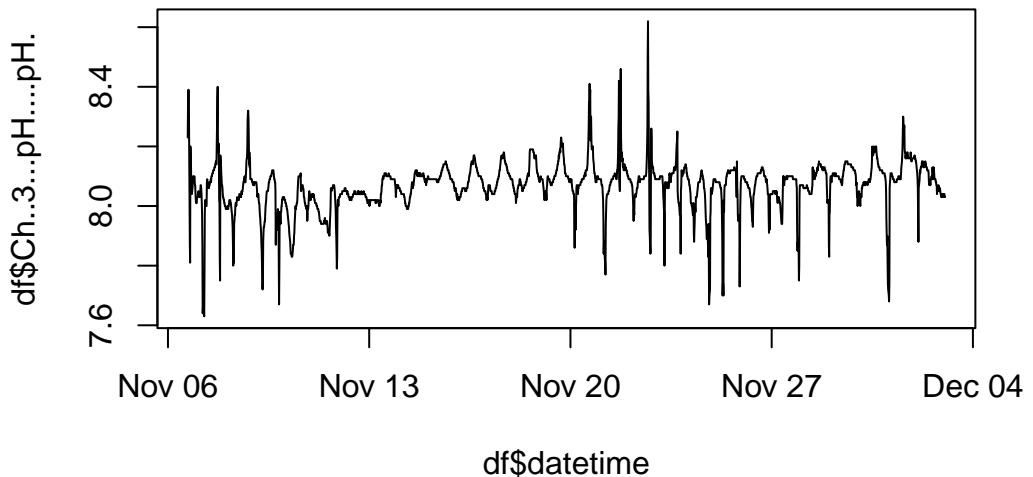
2659  
2660  
2661  
2662  
2663  
2664  
2665  
2666  
2667  
2668  
2669  
2670  
2671  
2672  
2673  
2674  
2675  
2676  
2677  
2678  
2679  
2680  
2681  
2682  
2683  
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2699  
2700  
2701

```
2702  
2703  
2704  
2705  
2706  
2707  
2708  
2709  
2710  
2711  
2712  
2713  
2714  
2715     Logged  
2716     Logged     Logged
```

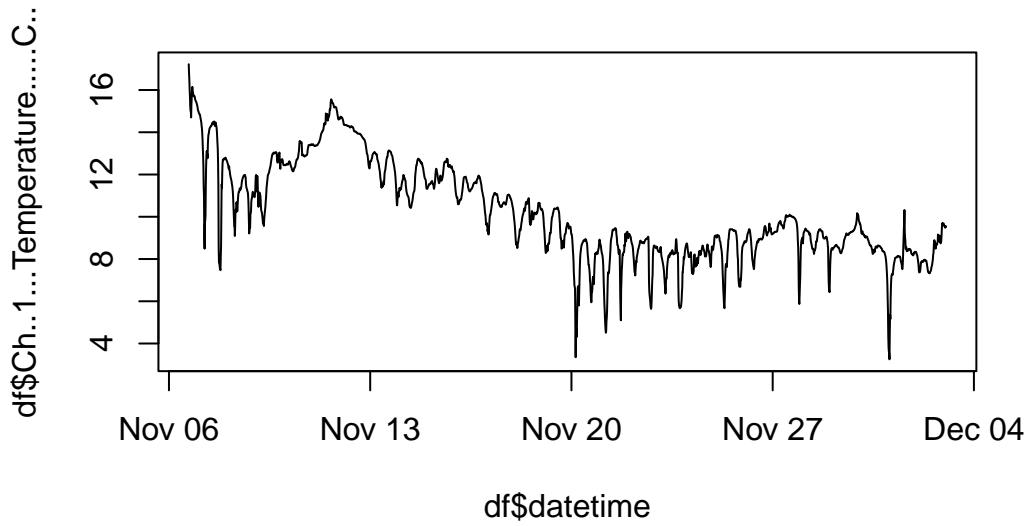
```
df$datetime <- as.POSIXct(strptime(df$Date.Time..EST., format = "%m/%d/%Y %H:%M:%S")) #Swi  
plot(df$datetime, df$Ch..3...pH....pH.)
```



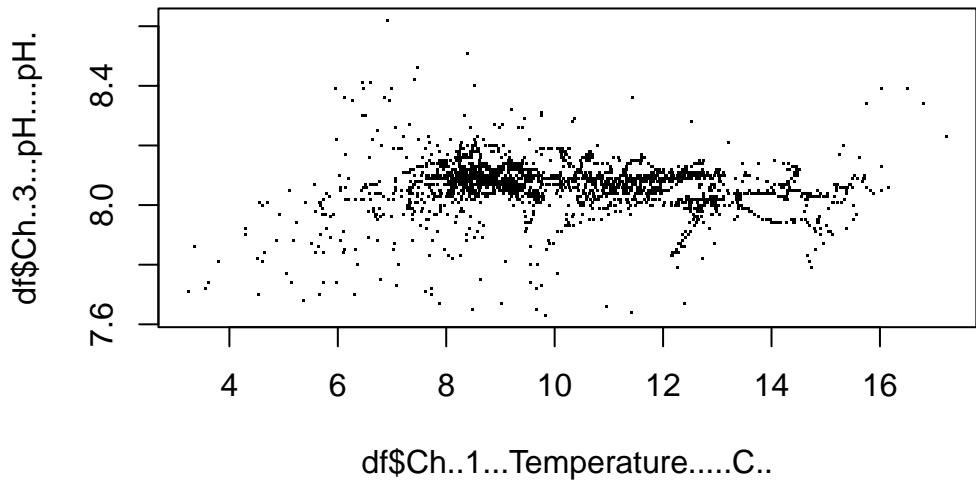
```
df <- df[df$datetime>"2022-11-07 13:00:00 EDT",]#"2022-11-07 13:00:00 EDT"
df <- df[df$datetime<"2022-12-04 00:00:00 EDT",]
plot(df$datetime, df$Ch..3...pH....pH., type = "l")
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "l")
```



```
plot(df$Ch..1...Temperature.....C.., df$Ch..3...pH....pH., pch = '.')
```



```

#Metadata
SN <- 076
tris <- 8.3
tris_temp <- 22.37

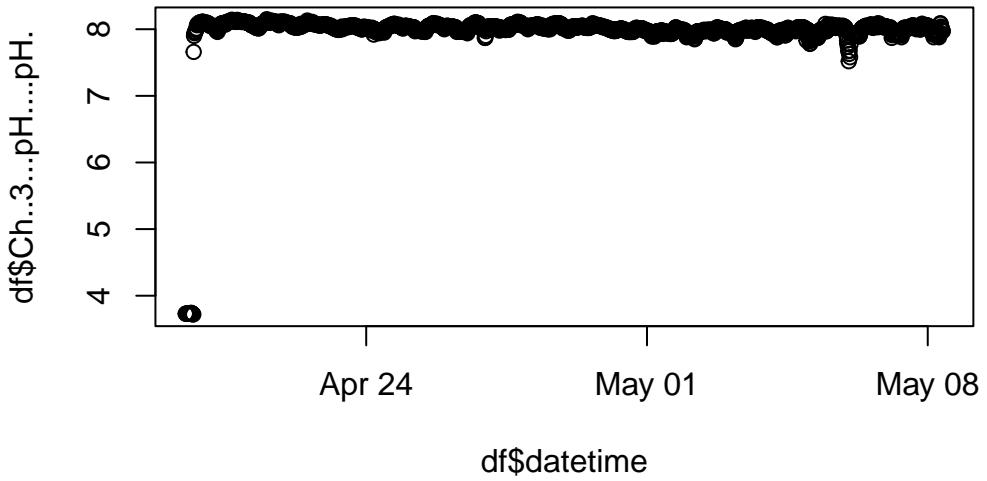
data_combined_new <- data.frame(
  Site = rep("Eel",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)

setwd(wdEel)
# May
#(open_file <- filenames[3])
open_file <- "21333340_Eel_Pond 2023-05-08 09_10_54 EDT (Data EDT).csv"

df <- read.csv(open_file, stringsAsFactors = F)
df$datetime <- as.POSIXct(strptime(df$Date.Time..EDT., format = "%m/%d/%Y %H:%M:%S")) #Char
plot(df$datetime, df$Ch..3...pH....pH.)

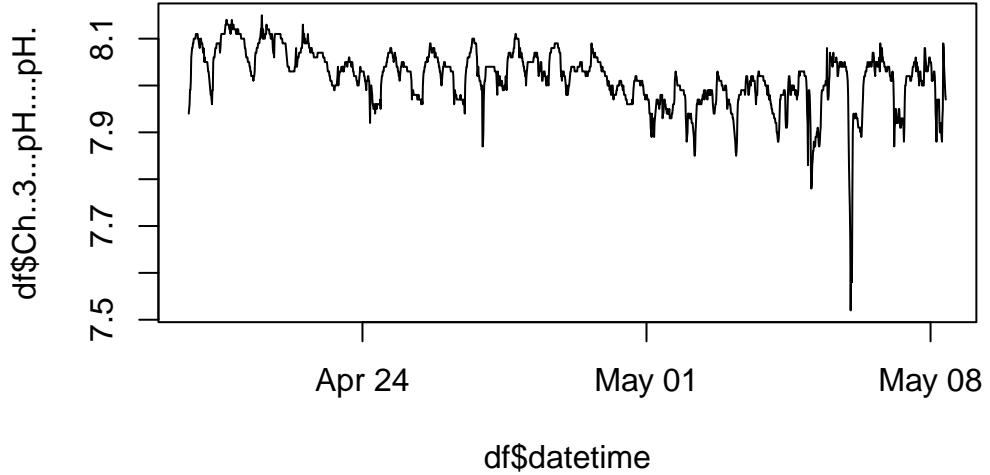
```



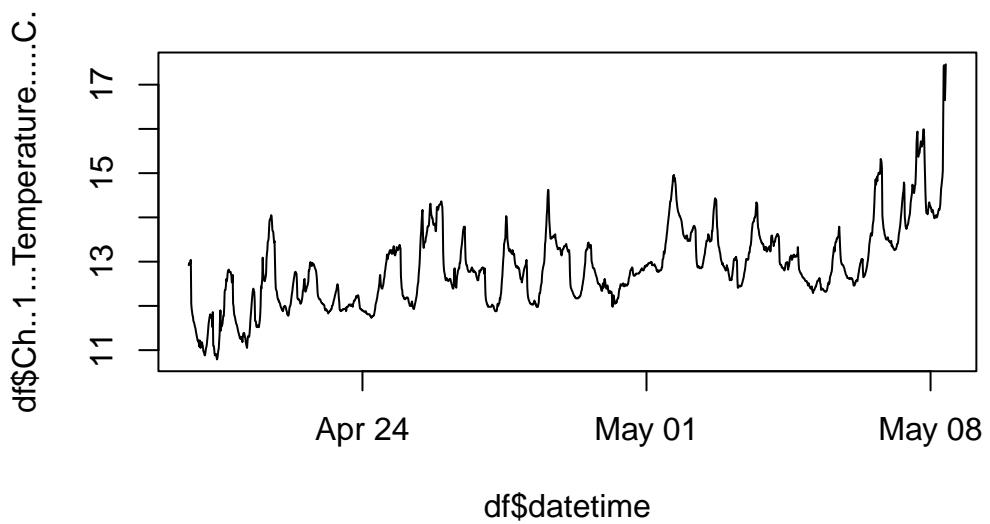
```

df <- df[df$datetime>"2023-04-19 17:00:00 EDT",]
#df <- df[df$datetime<"2022-12-05 00:00:00 EDT",]
plot(df$datetime, df$Ch..3...pH....pH., type = "l")

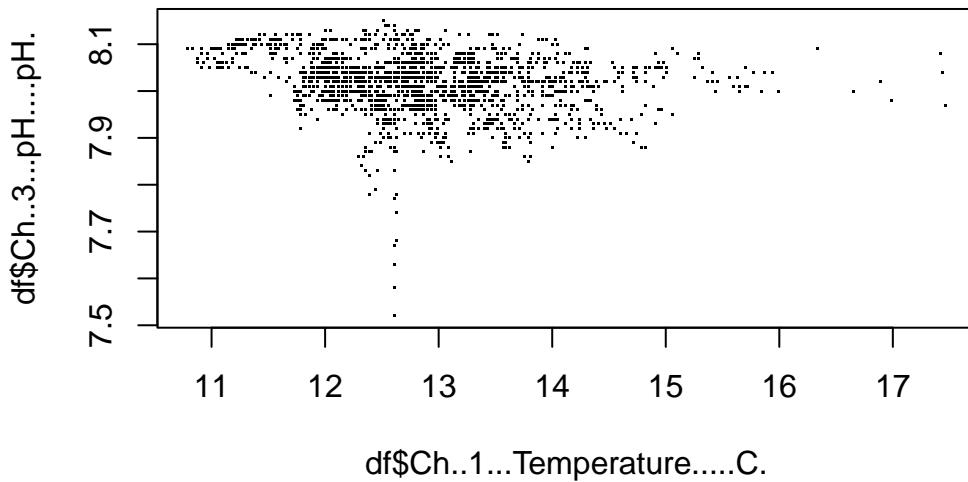
```



```
plot(df$datetime, df$Ch..1...Temperature.....C., type = "l")
```



```
plot(df$Ch..1...Temperature.....C., df$Ch..3...pH....pH., pch = '.')
```



```
#Metadata
SN <- 340
tris <- 8.37
tris_temp <- 18.00

data_combined_new <- data.frame(
  Site = rep("Eel",times = nrow(df)),
  Date = df$datetime,
  Temp = df$Ch..1...Temperature.....C.,
  pH = df$Ch..3...pH....pH.,
  Tris = rep(tris,length(df$datetime)),
  Tris_temp = rep(tris_temp,length(df$datetime)),
  Serial_number = rep(SN,length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)
```

```

setwd(wdEel)
# June
#(open_file <- filenames[3])
open_file <- "Eel_076 2023-06-11 14_39_04 EDT (Data EDT).csv"

```

```

df <- read.csv(open_file, stringsAsFactors = F)
tail(df)

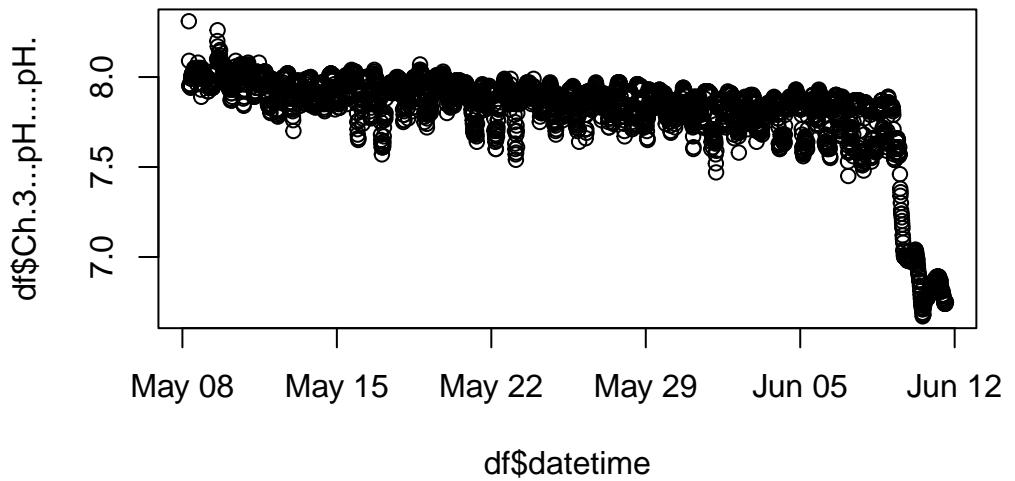
```

	X.	Date.Time..EDT.	Ch.1...Temperature.....C.	
3297	3297	06/11/2023 14:00:00		26.89
3298	3298	06/11/2023 14:15:00		26.72
3299	3299	06/11/2023 14:30:00		26.40
3300	3300	06/11/2023 14:38:52		NA
3301	3301	06/11/2023 14:38:53		NA
3302	3302	06/11/2023 14:38:54		NA
	Ch.2...Millivolts....mv.	Ch.3...pH....pH.	Button.Down	Button.Up
3297	-13.50		6.74	
3298	-13.78		6.75	
3299	-13.89		6.75	
3300	NA		NA	Logged
3301	NA		NA	Logged
3302	NA		NA	
	Host.Connected	End.of.File		
3297				
3298				
3299				
3300				
3301				
3302	Logged	Logged		

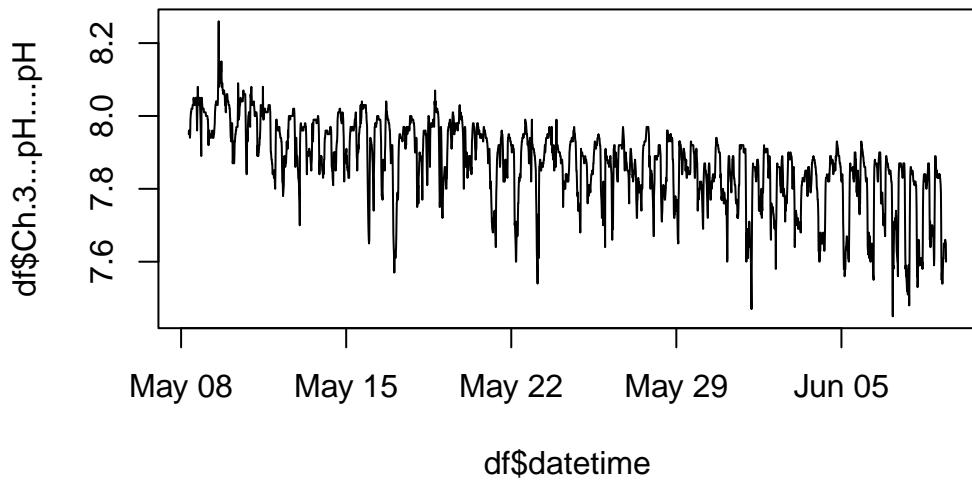
```

df$datetime <- as.POSIXct(strptime(df$date..EDT., format = "%m/%d/%Y %H:%M:%S")) #EDT
plot(df$datetime, df$Ch.3...pH....pH.)

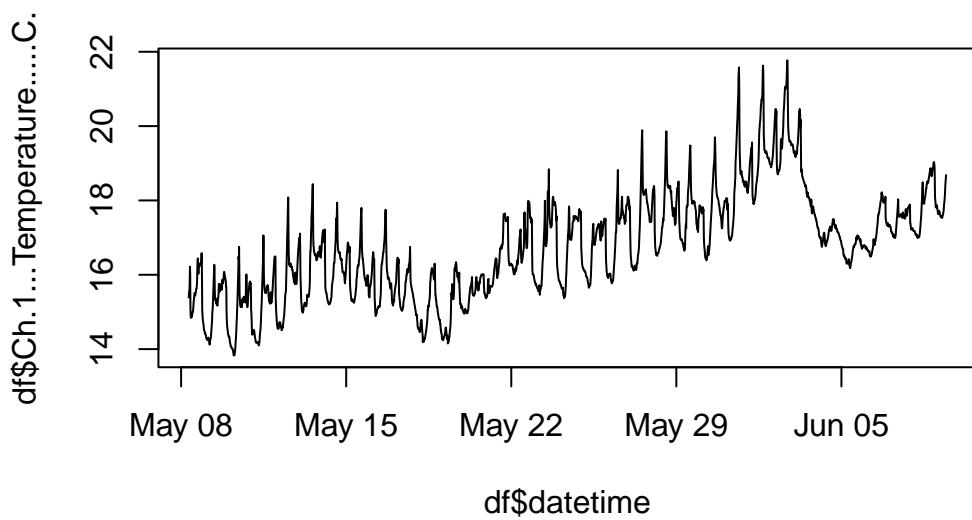
```



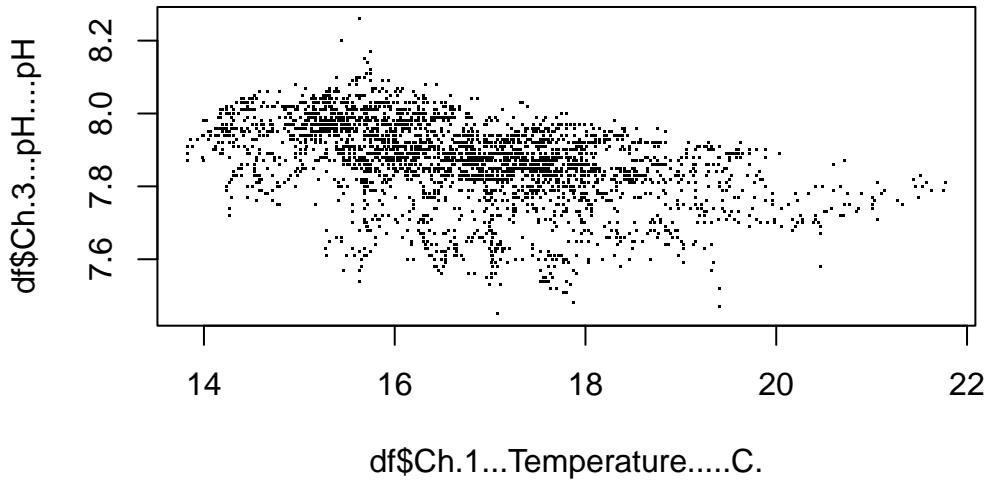
```
df <- df[df$datetime>"2023-05-08 07:30:00 EDT",]  
df <- df[df$datetime<"2023-06-09 10:45:00 EDT",]  
plot(df$datetime, df$Ch.3...pH....pH, type = "l")
```



```
plot(df$datetime, df$Ch.1...Temperature.....C., type = "l")
```



```
plot(df$Ch.1...Temperature.....C., df$Ch.3...pH....pH, pch = '.')
```



```
#Metadata
SN <- 076
tris <- 8.33
tris_temp <- 17.37

data_combined_new <- data.frame(
  Site = rep("Eel", times = length(df$datetime)),
  Date = df$datetime,
  Temp = df$Ch.1...Temperature.....C.,
  pH = df$Ch.3...pH....pH,
  Tris = rep(tris, length(df$datetime)),
  Tris_temp = rep(tris_temp, times = length(df$datetime)),
  Serial_number = rep(SN, times = length(df$datetime))
)

data_combined <- rbind(data_combined,data_combined_new)
```

## 0.2 Combine

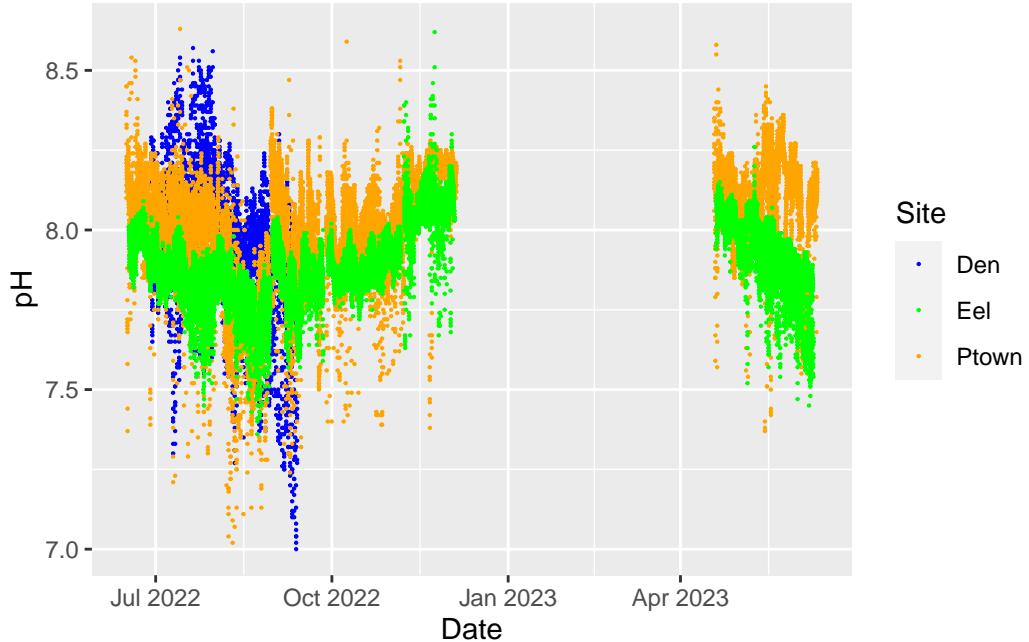
```
setwd("~/GitHub/EAD-ASEB-Ssolidissima-0A/projects/Seawater data/data/HOB0pHdata")

write.csv(data_combined, file = "pH data combined.csv")
# rm(list = ls())
# data_combined <- read.csv("pH data combined.csv", stringsAsFactors = FALSE)

g1 <- ggplot(data_combined, aes(x=Date, y=pH, colour = Site))+
  geom_point(cex = .1) +
  scale_color_manual(values=c("blue", "green", "orange"))

g1
```

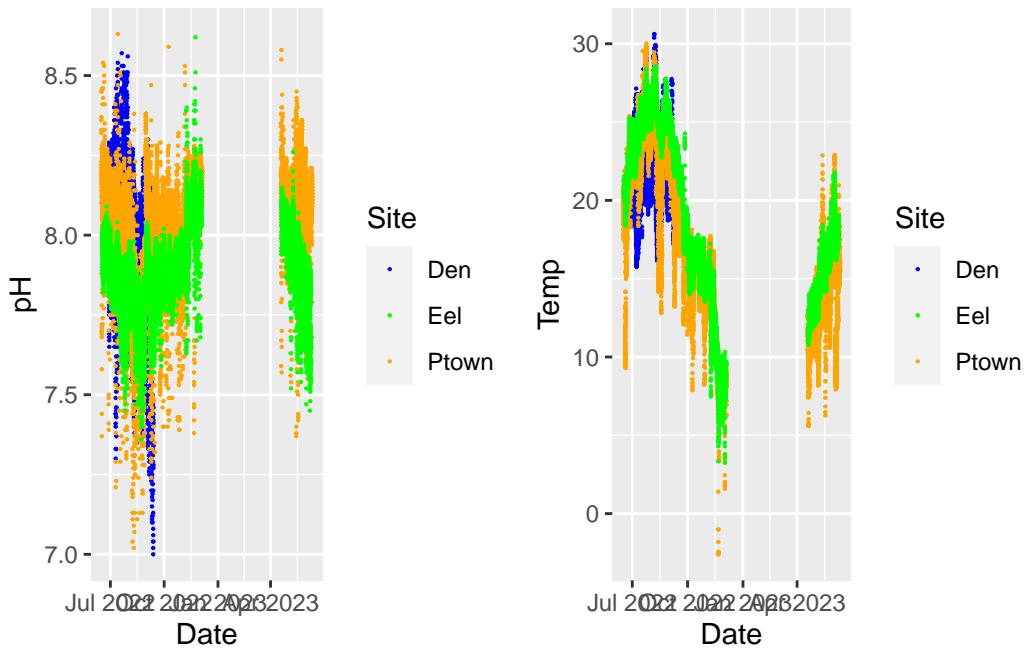
Warning: Removed 9 rows containing missing values (`geom\_point()`).



```
g2 <- ggplot(data_combined, aes(x=Date, y=Temp, colour = Site))+
  geom_point(cex = .1) +
  scale_color_manual(values=c("blue", "green", "orange"))

ggarrange(g1, g2)
```

```
Warning: Removed 9 rows containing missing values (`geom_point()`).
Removed 9 rows containing missing values (`geom_point()`).
```



```
min(data_combined$Date)
```

```
[1] "2022-06-15 18:09:46 EDT"
```

### 0.3 Calculate tris buffer offset and SW pH from NBS scale

```
tris_at_temp <- function(Tris_temp) {
  y=(11911.08-18.2499*35-0.039336*35*35)/(Tris_temp+273.15)+(-366.27059+0.53993607*35+0.00
  return(y)
}

test_dat <- data_combined[1:5,]
data_combined$offset <- data_combined$Tris-tris_at_temp(data_combined$Tris_temp)

plot(data_combined$offset, na.rm = TRUE)
```

```

Warning in plot.window(...): "na.rm" is not a graphical parameter

Warning in plot.xy(xy, type, ...): "na.rm" is not a graphical parameter

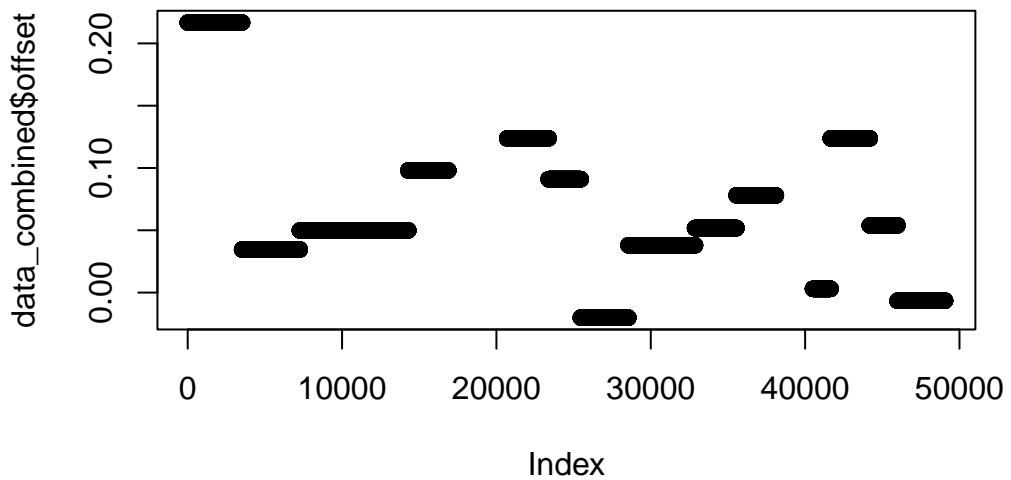
Warning in axis(side = side, at = at, labels = labels, ...): "na.rm" is not a
graphical parameter

Warning in axis(side = side, at = at, labels = labels, ...): "na.rm" is not a
graphical parameter

Warning in box(...): "na.rm" is not a graphical parameter

Warning in title(...): "na.rm" is not a graphical parameter

```



```

mean_offset <- mean(data_combined$offset, na.rm = TRUE)

data_combined[is.na(data_combined$offset), "offset"] <- mean_offset

data_combined$pH_corr <- data_combined$pH-data_combined$offset

```

```
if(params$Total_scale_corr==TRUE){  
  data_combined$pH <- data_combined$pH_corr}
```

### 0.3.1 Plot tides

```
# Plot tides  
setwd("~/GitHub/EAD-ASEB-Ssolidissima-0A/projects/Seawater data/data/Tides")  
dir()  
  
[1] "Den_Aug.txt"        "Den_Jul.txt"       "Den_Sep.txt"  
[4] "Hyannis_Apr23.txt" "Hyannis_Aug.txt"   "Hyannis_Dec.txt"  
[7] "Hyannis_Jul.txt"    "Hyannis_Jun23.txt" "Hyannis_May23.txt"  
[10] "Hyannis_Nov.txt"   "Hyannis_Oct.txt"  "Hyannis_Sep.txt"  
[13] "Ptown_Apr23.txt"   "Ptown_Aug.txt"   "Ptown_Dec.txt"  
[16] "Ptown_Jul.txt"     "Ptown_Jun23.txt" "Ptown_May23.txt"  
[19] "Ptown_Nov.txt"     "Ptown_Oct.txt"   "Ptown_Sep.txt"  
  
tides.Ptown1 <- read.table("Ptown_Jul.txt", skip =14)  
tides.Ptown2 <- read.table("Ptown_Aug.txt", skip =14)  
tides.Ptown3 <- read.table("Ptown_Sep.txt", skip =14)  
tides.Ptown4 <- read.table("Ptown_Oct.txt", skip =14)  
tides.Ptown5 <- read.table("Ptown_Nov.txt", skip =14)  
tides.Ptown6 <- read.table("Ptown_Dec.txt", skip =14)  
tides.Ptown7 <- read.table("Ptown_Apr23.txt", skip =14)  
tides.Ptown8 <- read.table("Ptown_May23.txt", skip =14)  
tides.Ptown9 <- read.table("Ptown_Jun23.txt", skip =14)  
tides.Den1 <- read.table("Den_Jul.txt", skip =14)  
tides.Den2 <- read.table("Den_Aug.txt", skip =14)  
tides.Den3 <- read.table("Den_Sep.txt", skip =14)  
tides.Eel1 <- read.table("Hyannis_Jul.txt", skip =14)  
tides.Eel2 <- read.table("Hyannis_Aug.txt", skip =14)  
tides.Eel3 <- read.table("Hyannis_Sep.txt", skip =14)  
tides.Eel4 <- read.table("Hyannis_Oct.txt", skip =14)  
tides.Eel5 <- read.table("Hyannis_Nov.txt", skip =14)  
tides.Eel6 <- read.table("Hyannis_Dec.txt", skip =14)  
tides.Eel7 <- read.table("Hyannis_Apr23.txt", skip =14)  
tides.Eel8 <- read.table("Hyannis_May23.txt", skip =14)  
tides.Eel9 <- read.table("Hyannis_Jun23.txt", skip =14)
```

```

tides.Ptown <- rbind(tides.Ptown1, tides.Ptown2, tides.Ptown3,
                      tides.Ptown4, tides.Ptown5, tides.Ptown6,
                      tides.Ptown7, tides.Ptown8, tides.Ptown9)
tides.Den <- rbind(tides.Den1, tides.Den2, tides.Den3)
tides.Eel <- rbind(tides.Eel1, tides.Eel2, tides.Eel3,
                     tides.Eel4, tides.Eel5, tides.Eel6,
                     tides.Eel7, tides.Eel8, tides.Eel9)

tides <- data.frame(tides = rbind(tides.Ptown,tides.Den,tides.Eel),
                     Site = as.factor(c(rep("Ptown",times=nrow(tides.Ptown)),
                     rep("Den",times=nrow(tides.Den)),
                     rep("Eel",times=nrow(tides.Eel)))))

names(tides)<- c("date","day","Time","Tideheight","Site")

Date1 <- paste(tides$date,tides$Time,sep=" ")

tides>Date <- as.POSIXct(strptime(Date1,format = "%Y/%m/%d %H:%M"),tz="Etc/GMT+5")

tides$Date[tides$Site=="Eel"] <- tides$Date[tides$Site=="Eel"]+ minutes(60) #Eel Pond tide

data_combined$Date<-as.POSIXct(data_combined$Date, tz="Etc/GMT+5")
data_combined$Date<-round_date(data_combined$Date, unit="minutes")

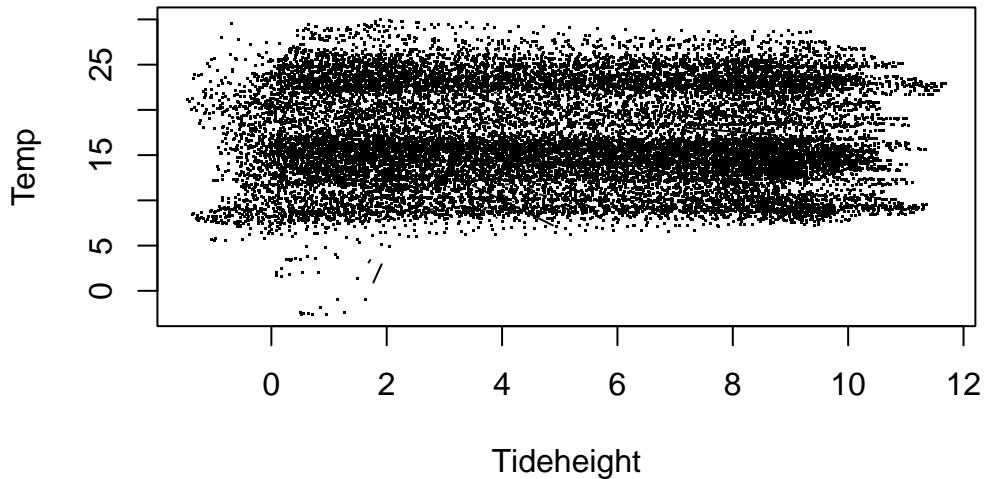
data_combined$Site<-as.factor(data_combined$Site)
data_combined$H_plus_conc<-10^(-data_combined$pH)

joined_df <- left_join(x=data_combined, y=tides, by= c("Date","Site"))

# Plot tides -----
Ptown <- joined_df[joined_df$Site=="Ptown",]
plot(Temp~Tideheight, pch =".",type ="b", data = Ptown, main="Ptown")

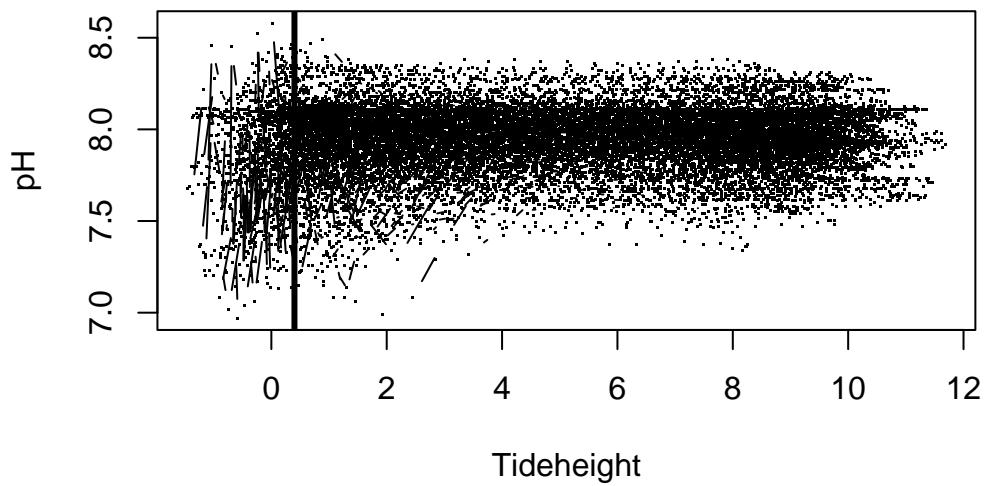
```

**Ptown**



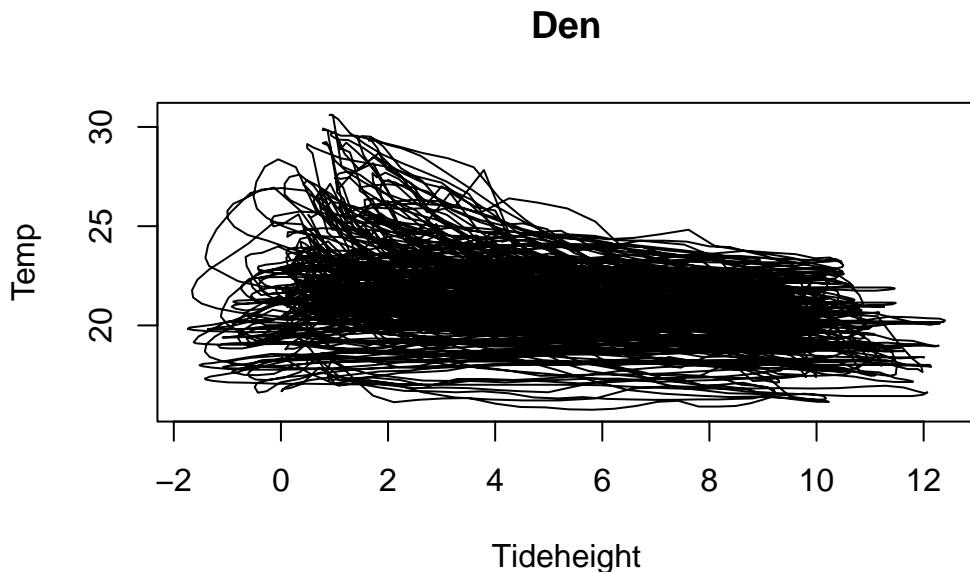
```
plot(pH~Tideheight,pch=". ",data = Ptown, type = "b", main="Ptown")
lines(x=c(.4,.4),y=c(5,9),lwd=3)
```

**Ptown**

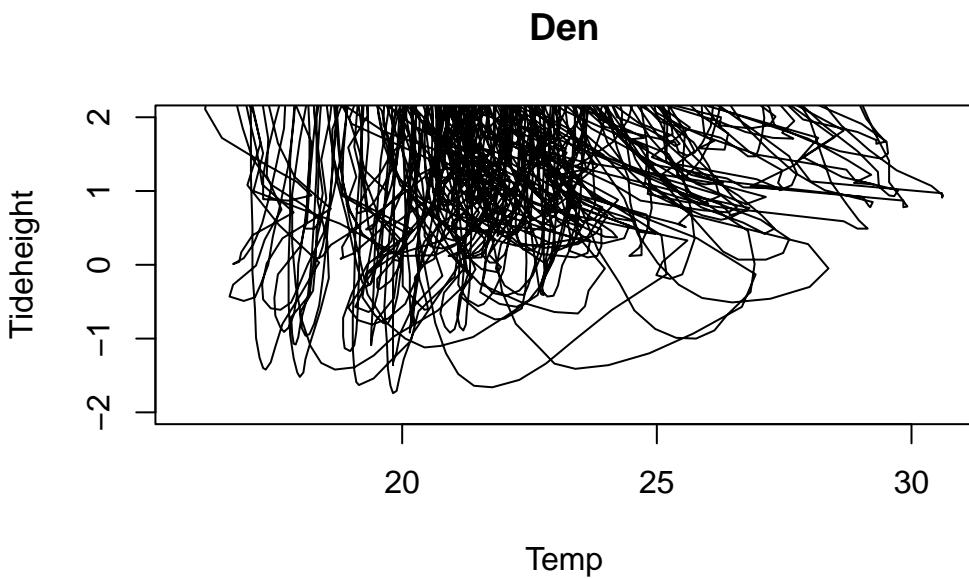


```
# This graph seems to demonstrate that pH goes up or down at low tide (I'm guessing night  
# but below a certain point goes to ~7.8 - I think this is when the pH probe is not  
# in water anymore.
```

```
Den <- joined_df[joined_df$Site=="Den",]  
plot(Temp~Tideheight, pch =".",type ="l", data = Den, main="Den")
```



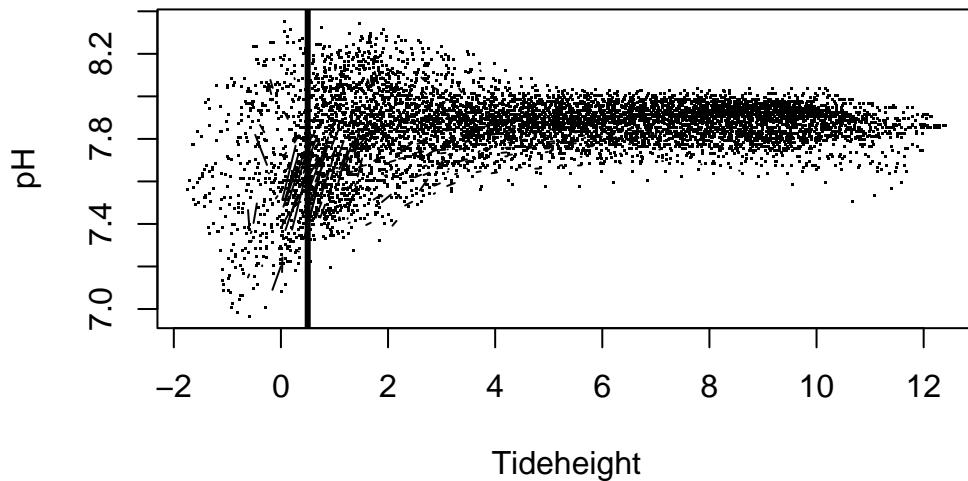
```
plot(Tideheight~Temp, pch =".",type ="l", data = Den, ylim = c(-2,2),main="Den")
```



```
# What concerns me are the lines where temp rapidly increases at low tide. I expect some
# I also wonder about introducing a lag of a few hours after the sensor has been out of the
```

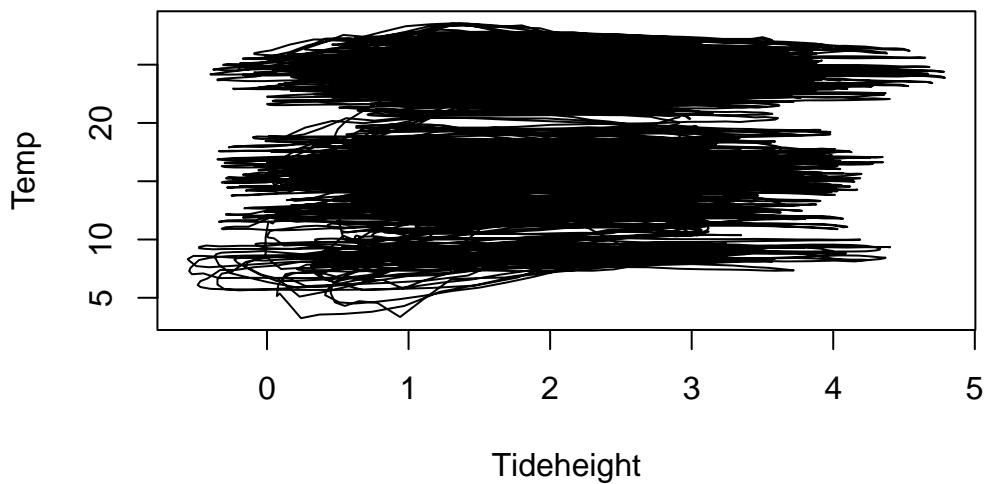
```
plot(pH~Tideheight,pch=". ",data = Den, type = "b", main="Den")
lines(x=c(.5,.5),y=c(5,9),lwd=3)
```

**Den**

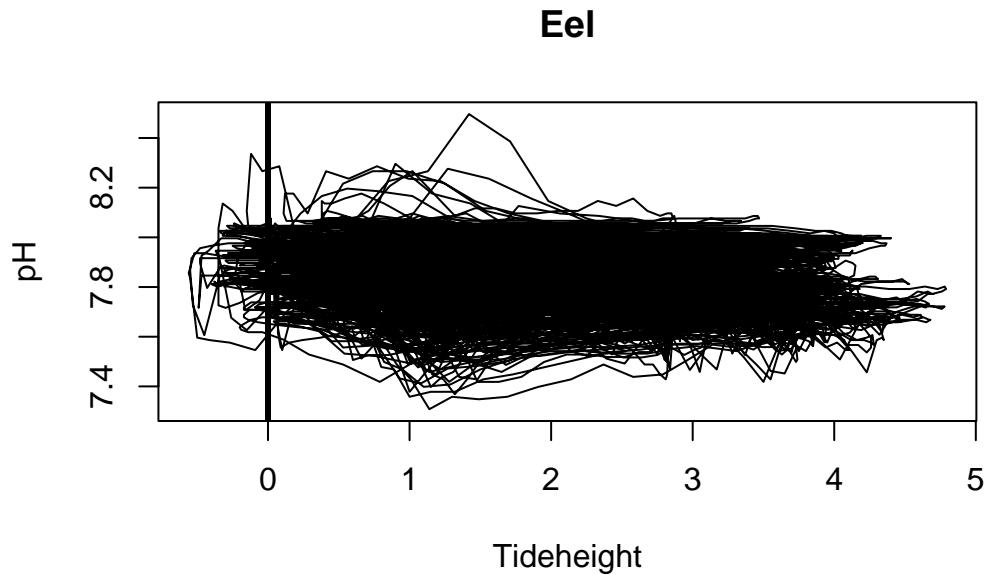


```
Eel <- joined_df[joined_df$Site=="Eel",]  
plot(Temp~Tideheight, pch =".",type ="l", data = Eel, main="Eel")
```

**Eel**

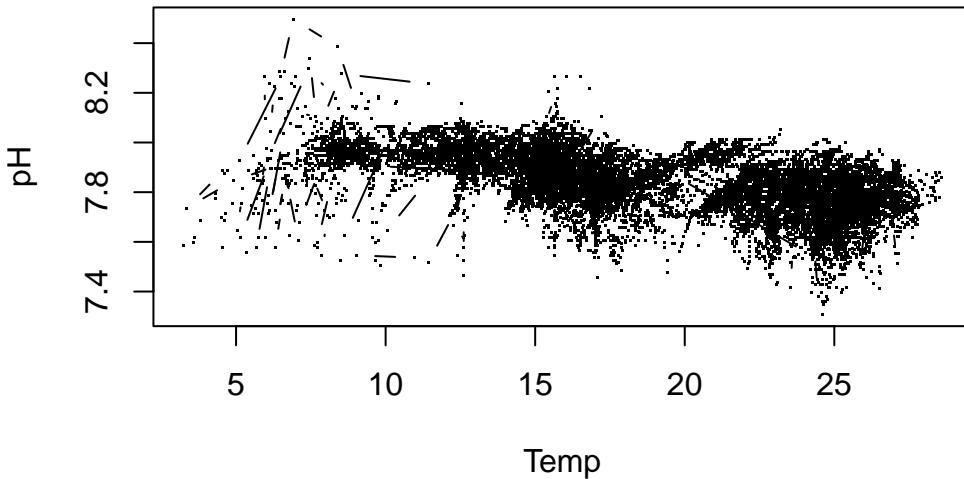


```
plot(pH~Tideheight,pch=".",data = Eel, type = "l", main="Eel")
lines(x=c(0,0),y=c(5,30),lwd=3)
```



```
plot(pH~Temp, pch =".",type ="b", data = Eel, main="Eel")
```

## Eel



```
# Not clear from data what tide is too low. It might be more wind-dependent.  
# At 0.5ft tide the cages are on sediment that is about 2.5 ft deep.  
# The sensor is installed <0.5ft above the sediment. However there is likely a mismatch be  
# The actual water level - the site water level does not vary much.  
# Honestly, I don't see anything in this data linked with the tides to suggest that I'm ge  
# If anything, the highest temps occur when the low tides are really minimal.  
# The HOBO temp logger will probably help the most in figuring this out,  
# it will help determine if there is some wind/tide-driven bad data or not due to sensor e
```

Exclude pH from times water below low tide mark.

```
Ptown <- Ptown[Ptown$Tideheight>1,] #This was at 0.4  
Den <- Den[Den$Tideheight>2,] #This was at .5  
Eel <- Eel[Eel$Tideheight>1,] #This was at 0.
```

```
# Aggregate data -----  
  
Ptown.hr <- aggregate(Ptown[,c("pH","Temp","H_plus_conc")],  
                      list(Date = cut(Ptown[,c("Date")], breaks="hour")),  
                      mean, na.rm = TRUE)  
Den.hr <- aggregate(Den[,c("pH","Temp","H_plus_conc")],
```

```

        list(Date = cut(Den[,c("Date")], breaks="hour")),
              mean, na.rm = TRUE)
Eel.hr <- aggregate(Eel[,c("pH","Temp","H_plus_conc")],
                      list(Date = cut(Eel[,c("Date")], breaks="hour")),
                          mean, na.rm = TRUE))

all.data.hr <- data.frame(
  rbind(Ptown.hr,Den.hr,Eel.hr),
  Site = as.factor(c(rep("Ptown",times = nrow(Ptown.hr)),
                     rep("Den",times = nrow(Den.hr)),
                     rep("Eel",times = nrow(Eel.hr)))))
)
all.data.hr$Date<- as.POSIXct(all.data.hr$Date)

# Calc true mean not arithmetic mean
all.data.hr$pH <- -log10(all.data.hr$H_plus_conc)

all.data.hr.break <- all.data.hr[1:3,]
all.data.hr.break$Date <- "2023-01-01 00:00:00"
all.data.hr.break$pH <- NA
all.data.hr.break$Temp <- NA
all.data.hr.break$Site <- c("Ptown", "Eel", "Den")
all.data.hr <- rbind(all.data.hr,all.data.hr.break)

head(all.data.hr)

      Date      pH      Temp H_plus_conc Site
1 2022-07-01 8.012621 21.5750 9.713577e-09 Ptown
2 2022-07-01 8.010142 21.5825 9.769170e-09 Ptown
3 2022-07-01 8.015114 21.6875 9.657984e-09 Ptown
4 2022-07-01 8.027563 21.9675 9.385050e-09 Ptown
5 2022-07-01 7.994369 21.7700 1.013051e-08 Ptown
6 2022-07-01 7.977621 21.6700 1.052881e-08 Ptown

Ptown.dy <- aggregate(Ptown[,c("pH","Temp","H_plus_conc")],
                      list(Date = cut(Ptown[,c("Date")], breaks="day")),
                          mean, na.rm = TRUE)
Den.dy <- aggregate(Den[,c("pH","Temp","H_plus_conc")],
                      list(Date = cut(Den[,c("Date")], breaks="day")),
                          mean, na.rm = TRUE)
Eel.dy <- aggregate(Eel[,c("pH","Temp","H_plus_conc")],

```

```

        list(Date = cut(Eel[,c("Date")], breaks="day")),
             mean, na.rm = TRUE)

all.data.dy <- data.frame(
  rbind(Ptown.dy,Den.dy,Eel.dy),
  Site = as.factor(c(rep("Ptown",times = nrow(Ptown.dy)),
    rep("Den",times = nrow(Den.dy)),
    rep("Eel",times = nrow(Eel.dy)))))

)
all.data.dy$Date<- as.POSIXct(all.data.dy$Date)

# Calc true mean not arithmetic mean
all.data.dy$pH <- -log10(all.data.dy$H_plus_conc)

all.data.dy.break <- all.data.dy[1:3,]
all.data.dy.break$Date <- "2023-01-01 00:00:00"
all.data.dy.break$pH <- NA
all.data.dy.break$Temp <- NA
all.data.dy.break$Site <- c("Ptown", "Eel", "Den")
all.data.dy <- rbind(all.data.dy,all.data.dy.break)

head(all.data.dy)

```

	Date	pH	Temp	H_plus_conc	Site
1	2022-07-01	8.053165	23.00326	8.847801e-09	Ptown
2	2022-07-02	7.939929	22.69551	1.148342e-08	Ptown
3	2022-07-03	7.940791	22.50157	1.146065e-08	Ptown
4	2022-07-04	7.974888	22.94489	1.059526e-08	Ptown
5	2022-07-05	7.974465	22.54978	1.060558e-08	Ptown
6	2022-07-06	7.882676	22.04812	1.310158e-08	Ptown

```

Ptown.wk <- aggregate(Ptown[,c("pH","Temp","H_plus_conc")],
  list(Date = cut(Ptown[,c("Date")], breaks="week")),
       mean, na.rm = TRUE)
Den.wk <- aggregate(Den[,c("pH","Temp","H_plus_conc")],
  list(Date = cut(Den[,c("Date")], breaks="week")),
       mean, na.rm = TRUE)
Eel.wk <- aggregate(Eel[,c("pH","Temp","H_plus_conc")],
  list(Date = cut(Eel[,c("Date")], breaks="week")),
       mean, na.rm = TRUE)

```

```

all.data.wk <- data.frame(
  rbind(Ptown.wk,Den.wk,Eel.wk),
  Site = as.factor(c(rep("Ptown",times = nrow(Ptown.wk)),
    rep("Den",times = nrow(Den.wk)),
    rep("Eel",times = nrow(Eel.wk)))),
  )
all.data.wk$Date<- as.POSIXct(all.data.wk$Date)

# Calc true mean not arithmetic mean
all.data.wk$pH <- -log10(all.data.wk$H_plus_conc)

head(all.data.wk)

```

	Date	pH	Temp	H_plus_conc	Site
1	2022-06-27	7.974805	22.73345	1.059729e-08	Ptown
2	2022-07-04	7.962630	22.70027	1.089857e-08	Ptown
3	2022-07-11	7.975789	23.07012	1.057331e-08	Ptown
4	2022-07-18	7.936860	26.29307	1.156485e-08	Ptown
5	2022-07-25	7.914160	24.48628	1.218540e-08	Ptown
6	2022-08-01	7.848655	25.52954	1.416918e-08	Ptown

```

all.data.wk.break <- all.data.wk[1:3,]
all.data.wk.break$Date <- "2023-01-01 00:00:00"
all.data.wk.break$pH <- NA
all.data.wk.break$Temp <- NA
all.data.wk.break$Site <- c("Ptown", "Eel", "Den")
all.data.wk <- rbind(all.data.wk,all.data.wk.break)
tail(all.data.wk)

```

	Date	pH	Temp	H_plus_conc	Site
72	2023-05-22	7.848816	16.94782	1.416395e-08	Eel
73	2023-05-29	7.802413	18.35191	1.576111e-08	Eel
74	2023-06-05	7.713740	17.39683	1.933126e-08	Eel
75	2023-01-01	NA	NA	1.059729e-08	Ptown
76	2023-01-01	NA	NA	1.089857e-08	Eel
77	2023-01-01	NA	NA	1.057331e-08	Den

### 0.3.2 Final plots

```
# plot(all.data$Date, all.data$pH,
#       color = as.factor(data_combined$Site), pch = ".")  
  
sampling.pH <- data.frame(  
  x = as.POSIXct(c("2022-06-29 00:00:00 EDT", "2022-08-2 00:00:00 EDT", "2022-09-9 00:00:00  
  y = c(7.5, 7.5, 7.5, 7.5, 7.5, 7.5)  
)  
sampling.temp <- data.frame(  
  x = as.POSIXct(c("2022-06-29 00:00:00 EDT", "2022-08-2 00:00:00 EDT", "2022-09-9 00:00:00  
  y = c(5, 5, 5, 5, 5, 5)  
)  
  
theme_set(theme_bw())  
  
colors <- c(  
  "Den"="blue",  
  "Eel"="green",  
  "Ptown"="orange",  
  "Date sampled"="black"  
)  
  
#scale_color_manual(values=c("blue", "green", "orange"))  
  
# Now I'm aggregating by day... and this is a bit easier to digest when comparing among sites  
head(all.data.wk)  
  
      Date      pH      Temp H_plus_conc Site  
1 2022-06-27 7.974805 22.73345 1.059729e-08 Ptown  
2 2022-07-04 7.962630 22.70027 1.089857e-08 Ptown  
3 2022-07-11 7.975789 23.07012 1.057331e-08 Ptown  
4 2022-07-18 7.936860 26.29307 1.156485e-08 Ptown  
5 2022-07-25 7.914160 24.48628 1.218540e-08 Ptown  
6 2022-08-01 7.848655 25.52954 1.416918e-08 Ptown  
  
str(all.data.wk)  
  
'data.frame': 77 obs. of 5 variables:  
 $ Date : POSIXct, format: "2022-06-27" "2022-07-04" ...
```

```

$ pH           : num  7.97 7.96 7.98 7.94 7.91 ...
$ Temp         : num  22.7 22.7 23.1 26.3 24.5 ...
$ H_plus_conc: num  1.06e-08 1.09e-08 1.06e-08 1.16e-08 1.22e-08 ...
$ Site         : Factor w/ 3 levels "Den","Eel","Ptown": 3 3 3 3 3 3 3 3 3 ...

```

```

gg1 <- ggplot(all.data.wk, aes(x=Date, y=pH, colour = Site))+  

  geom_point(cex = 1) +  

  geom_line(cex = 1)+  

  ylim(7.5,8.3)+  

  #xlim(as.POSIXct(c("2022-06-29 00:00:00 EDT","2022-09-9 00:00:00 EDT")))+  

  geom_point(data = sampling.pH, aes(x,y), color = "black", cex = 5)+  

  scale_color_manual(values=colors) +  

  guides(colour = guide_legend(override.aes = list(size=5)))+  

  ggtitle('B. pH')

```

Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.  
i Please use `linewidth` instead.

```

ylab = expression("Temperature " ( degree*C))

gg2 <- ggplot(all.data.wk, aes(x=Date, y=Temp, colour = Site))+  

  geom_point(cex = 1) +  

  geom_line(cex = 1)+  

  labs(y=ylab)+  

  #ylim(14,30)+  

  #xlim(as.POSIXct(c("2022-06-29 00:00:00 EDT","2022-09-9 00:00:00 EDT")))+  

  geom_point(data = sampling.temp, aes(x,y), color = "black", cex = 5)+  

  scale_color_manual(values=colors) +  

  guides(colour = guide_legend(override.aes = list(size=5)))+  

  ggtitle('A. Temp')

```

```
ggarrange(gg2, gg1, common.legend = TRUE, legend="bottom")
```

Warning: Removed 3 rows containing missing values (`geom\_point()`).

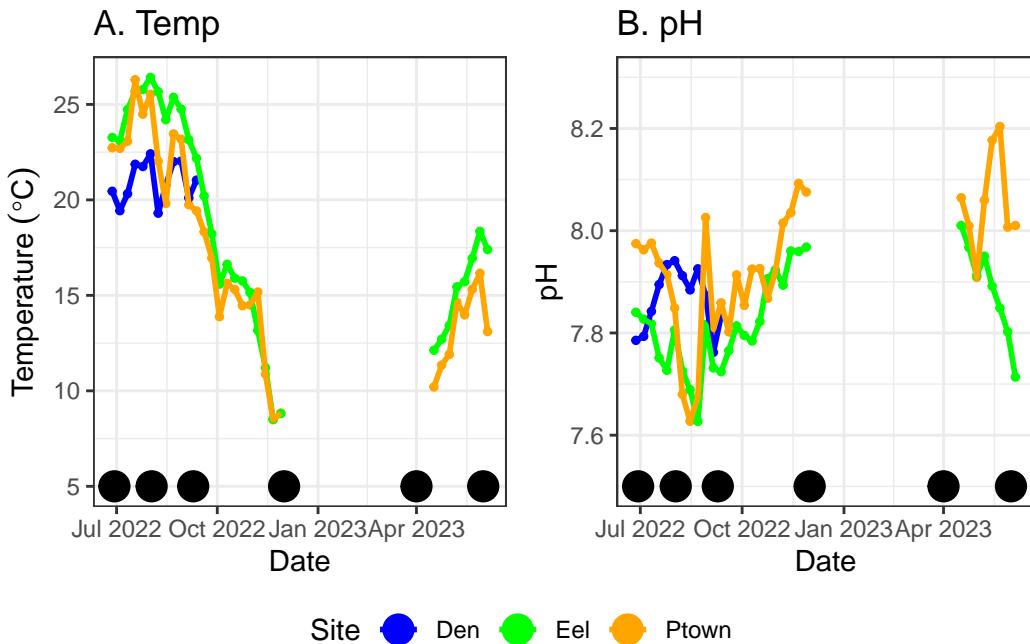
Warning: Removed 1 row containing missing values (`geom\_line()`).

Warning: Removed 3 rows containing missing values (`geom\_point()`).

```
Warning: Removed 1 row containing missing values (`geom_line()`).
```

```
Warning: Removed 3 rows containing missing values (`geom_point()`).
```

```
Warning: Removed 1 row containing missing values (`geom_line()`).
```



```
#  
  
setwd("~/GitHub/EAD-ASEB-Ssolidissima-0A/projects/Seawater data/data/HOB0pHdata")  
write.csv(all.data.wk, file="Summary_weekly_ave.csv")  
write.csv(all.data.dy, file="Summary_daily_ave.csv")
```

### 0.3.3 Compare with surfclam carbonate chemistry data

```
dir_data <- "~/GitHub/EAD-ASEB-Ssolidissima-0A/projects/Seawater data/data/Carbonate chem/  
carb_dat <- read.csv(paste(dir_data,"Surfclam_carbonate_data_wgraphs.csv", sep = ""), stri  
carb_dat$Date <- as.POSIXct(carb_dat$Date, format = "%m/%d/%y")  
carb_dat <- carb_dat[!is.na(carb_dat$Date),]  
carb_dat$Site[carb_dat$Site == "Eel Pond"] <- "Eel"
```

```

carb_dat$Site[carb_dat$Site == "Provincetown"] <- "Ptown"
carb_dat$Site[carb_dat$Site == "East Dennis (aquaculture)"] <- "Den"
carb_dat$Site <- as.factor(carb_dat$Site)

sampling.pH <- data.frame(
  x = as.POSIXct(c("2022-06-29 00:00:00 EDT", "2022-08-2 00:00:00 EDT", "2022-09-9 00:00:00
  y = rep(7.2, 6)
)
sampling.temp <- data.frame(
  x = as.POSIXct(c("2022-06-29 00:00:00 EDT", "2022-08-2 00:00:00 EDT", "2022-09-9 00:00:00
  y = rep(0,6)
)

gg1 <- ggplot(all.data.dy, aes(x=Date, y=pH, colour = Site))+  

  geom_line(cex = 1)+  

  ylim(7.2,8.3)+  

#xlim(as.POSIXct(c("2022-06-29 00:00:00 EDT", "2022-09-9 00:00:00 EDT")))+  

  geom_point(data = sampling.pH, aes(x,y), color = "black", cex = 1)+  

  scale_color_manual(values=colors) +  

  guides(colour = guide_legend(override.aes = list(size=5)))+  

  ggtitle('B. pH')+  

  geom_point(data = carb_dat[carb_dat$Stratum=="Bottom water",],aes(x=Date, y = InSitu.pH,  

  carb_dat$Water.Sediment..Temp

```

```

[1] 23.6 16.5 18.9 18.5 23.7 24.9 26.3 22.6 23.0 25.5 25.6 23.9 25.0 15.4 16.1  

[16] 17.3 9.2 8.1 4.5 5.0 7.6 12.2 15.2 18.5 19.0 16.8 18.1 21.7 21.3 24.5  

[31] 16.6 20.7 12.3 16.4 16.9 8.4 8.6 4.7 4.6 5.9 12.3 17.3 17.9 23.6 16.5  

[46] 18.9 18.5 23.7 24.9 26.3 22.6 23.0 25.5 25.6 23.9 25.0 15.4 16.1 17.3 9.2  

[61] 8.1 4.5 5.0 7.6 12.2 15.2 18.5 19.0 16.8 18.1 21.7 21.3 24.5 16.6 20.7  

[76] 12.3 16.4 16.9 8.4 8.6 4.7 4.6 5.9 12.3 17.3 17.9 NA NA NA NA  

[91] NA NA NA NA NA NA NA 23.9 25.0 15.4 16.1 17.3 9.2 4.5  

[106] 5.0 7.6 12.2 15.2 18.5 NA NA NA NA NA NA NA 16.6 20.7  

[121] 12.3 16.4 16.9 8.4 8.6 4.7 4.6 5.9 12.3 17.3 17.9 NA NA NA NA  

[136] NA NA NA NA NA NA NA 23.9 25.0 15.4 16.1 17.3 9.2 4.5  

[151] 5.0 7.6 12.2 15.2 18.5 NA NA NA NA NA NA NA 16.6 20.7  

[166] 12.3 16.4 16.9 8.4 8.6 4.7 4.6 5.9 12.3 17.3 17.9

```

```
carb_dat$Stratum
```

```
[1] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
```

```

[6] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[11] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[16] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[21] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[26] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[31] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[36] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[41] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[46] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[51] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[56] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[61] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[66] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[71] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[76] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[81] "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water" "Bottom water"
[86] "Bottom water" "2cm" "2cm" "2cm" "2cm" "2cm control"
[91] "2cm" "2cm" "2cm control" "2cm" "2cm control"
[96] "2cm" "2cm" "2cm" "2cm" "2cm"
[101] "2cm" "2cm" "2cm" "2cm" "2cm"
[106] "2cm" "2cm" "2cm" "2cm" "2cm"
[111] "2cm" "2cm" "2cm" "2cm control" "2cm"
[116] "2cm" "2cm control" "2cm" "2cm" "2cm"
[121] "2cm" "2cm" "2cm" "2cm" "2cm"
[126] "2cm" "2cm" "2cm" "2cm" "2cm"
[131] "2cm" "2cm" "2cm" "2cm" "2cm control"
[136] "2cm" "2cm" "2cm control" "2cm" "2cm control"
[141] "2cm" "2cm" "2cm" "2cm" "2cm"
[146] "2cm" "2cm" "2cm" "2cm" "2cm"
[151] "2cm" "2cm" "2cm" "2cm" "2cm"
[156] "2cm" "2cm" "2cm" "2cm control" "2cm"
[161] "2cm" "2cm control" "2cm" "2cm" "2cm"
[166] "2cm" "2cm" "2cm" "2cm" "2cm"
[171] "2cm" "2cm" "2cm" "2cm" "2cm"
[176] "2cm"

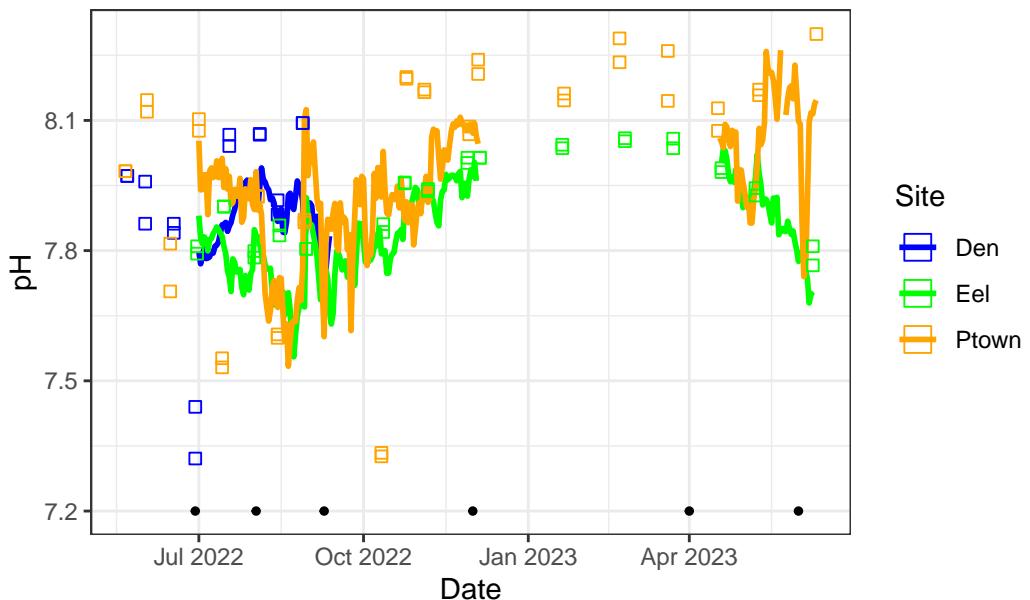
```

gg1

Warning: Removed 1 row containing missing values (`geom\_line()`).

Warning: Removed 1 rows containing missing values (`geom\_point()`).

### B. pH



```

ylab = expression("Temperature " ( degree*C))

gg2 <- ggplot(all.data.dy, aes(x=Date, y=Temp, colour = Site))+  

  geom_line(cex = 1)+  

  labs(y=ylab)+  

  ylim(0,30)+  

  #xlim(as.POSIXct(c("2022-06-29 00:00:00 EDT","2022-09-9 00:00:00 EDT")))+  

  geom_point(data = sampling.temp, aes(x,y), color = "black", cex = 1)+  

  scale_color_manual(values=colors) +  

  guides(colour = guide_legend(override.aes = list(size=5)))+  

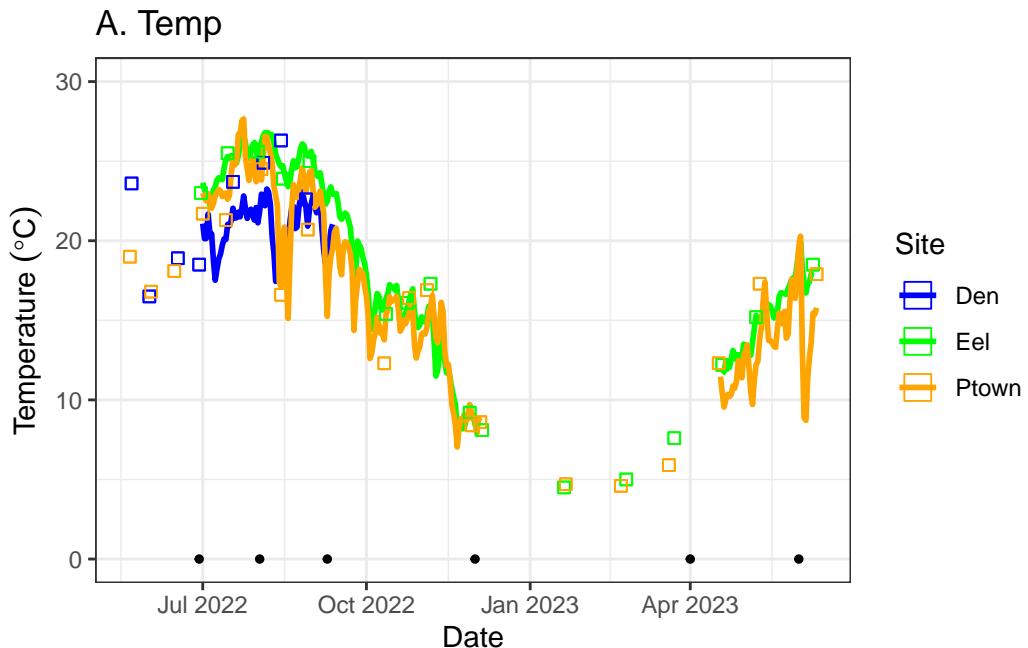
  ggtitle('A. Temp')+  

  geom_point(data = carb_dat[carb_dat$Stratum=="Bottom water",],aes(x=Date, y = Water.Sedi  

gg2

```

Warning: Removed 1 row containing missing values (`geom\_line()`).

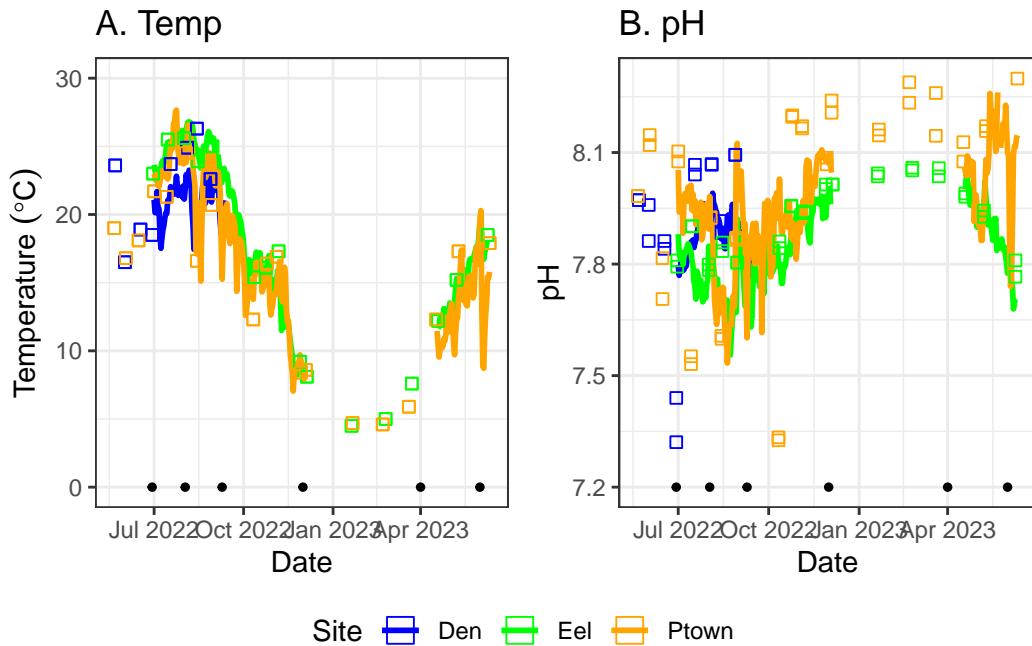


```
ggarrange(gg2, gg1, common.legend = TRUE, legend="bottom")
```

Warning: Removed 1 row containing missing values (`geom\_line()`).

Warning: Removed 1 row containing missing values (`geom\_line()`).  
Removed 1 row containing missing values (`geom\_line()`).

Warning: Removed 1 rows containing missing values (`geom\_point()`).



```
# I need to add all of the tide data so I can subset the data using tide data
```

```
# Tide data websites:  

#https://tidesandcurrents.noaa.gov/map/index.html  

# Dennis https://tidesandcurrents.noaa.gov/noaatidepredictions.html?id=8447241&units=stand  

# Falmouth - only L/H: https://tidesandcurrents.noaa.gov/noaatidepredictions.html?id=84478  

# Hyannis - https://tidesandcurrents.noaa.gov/noaatidepredictions.html?id=8447605  

# Note I'm using the Hyannis dataset because they have down to 1min predictions. Falmouth  

# Compared to Eel Pond Entrance on Willy Weather, Hyannis is ~30 min behind - which is per  

# Willy Weather says it is.
```