

MA DMF Video Monitoring – River Herring



Introduction

- River Herring monitoring – complex
- Variety of counting methods
 - Volunteer counting
 - Tube counters
 - Video monitoring

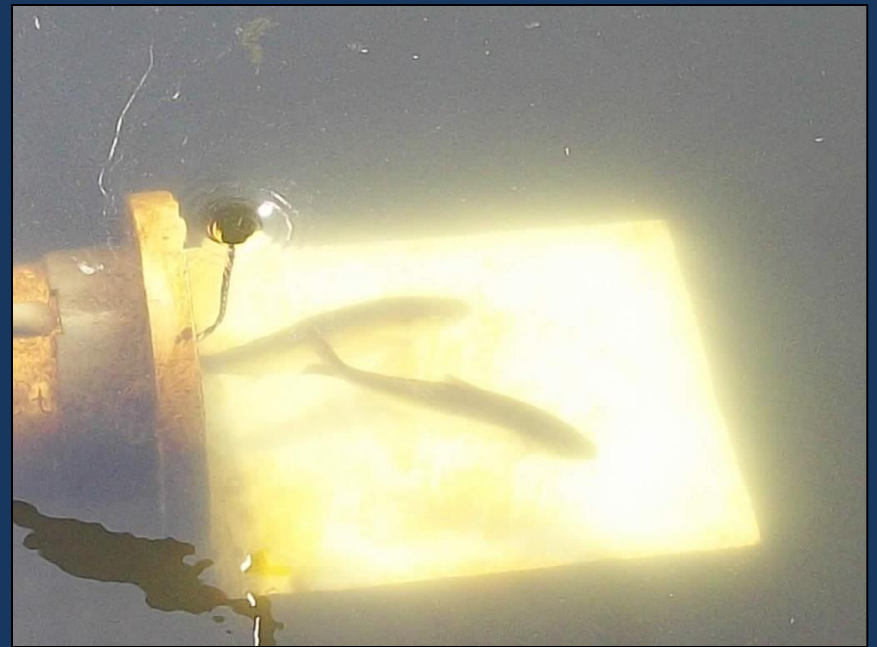
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DATE	TIME	AIR TEMP	WATER TEMP	WEATHER	BAROM. PRESSURE	10 Minute FISH COUNT	REMARKS
5-4	13:33	67	60	pt cloudy	29.01	495	CC
5-4	14:55	65	60	pt cloudy	29.2	690	TB
5/4	15:35	67	60	pt sunny	29.24	486	CC
5/4	17:30	62	60	" "	29.16	511	CC 3 suckers
5/4	18:05	60	60	pt sunny	29.2	551	TB 1 sucker
5/5	7:45	54	54	partly sunny	29.6	173	BWD
5/5	9:10	58	54	" "	29.6	163	✓
5/5	9:35	60.8	58.1	100% clouds	29.5	226	1 sucker
5/5	13:24	72	58	pt cloudy	29.4	482	CC
5/5	14:20	65	58	" "	29.42	310	≠
5/5	15:00	65	58	" "	29.42	347	CC
5/5	16:00	65	58	" "	29.40	410	CC
5-5	17:15	68	59	cloudy	29.48	502	⊕

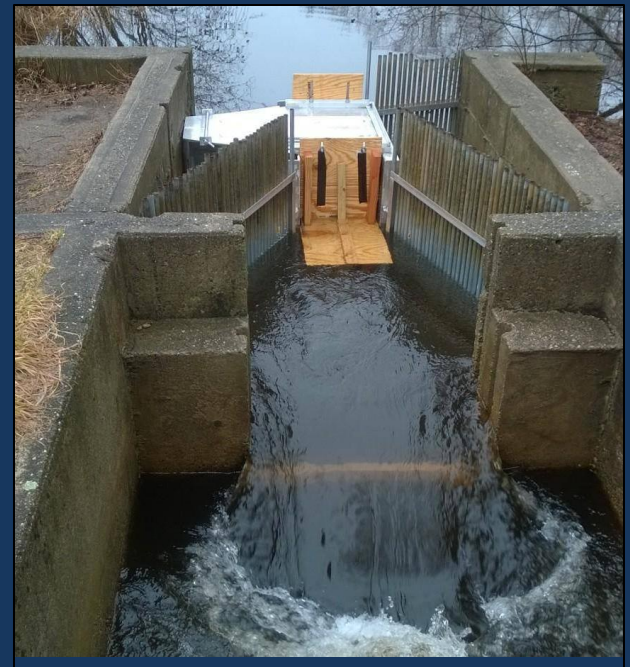
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Video Counters

- Advantages
 - Species identification
 - Complete record of run
 - Potential outreach tool
- Disadvantages
 - Initial investment (\$4-10,000)
 - High maintenance
 - Data quantity

Video Counters

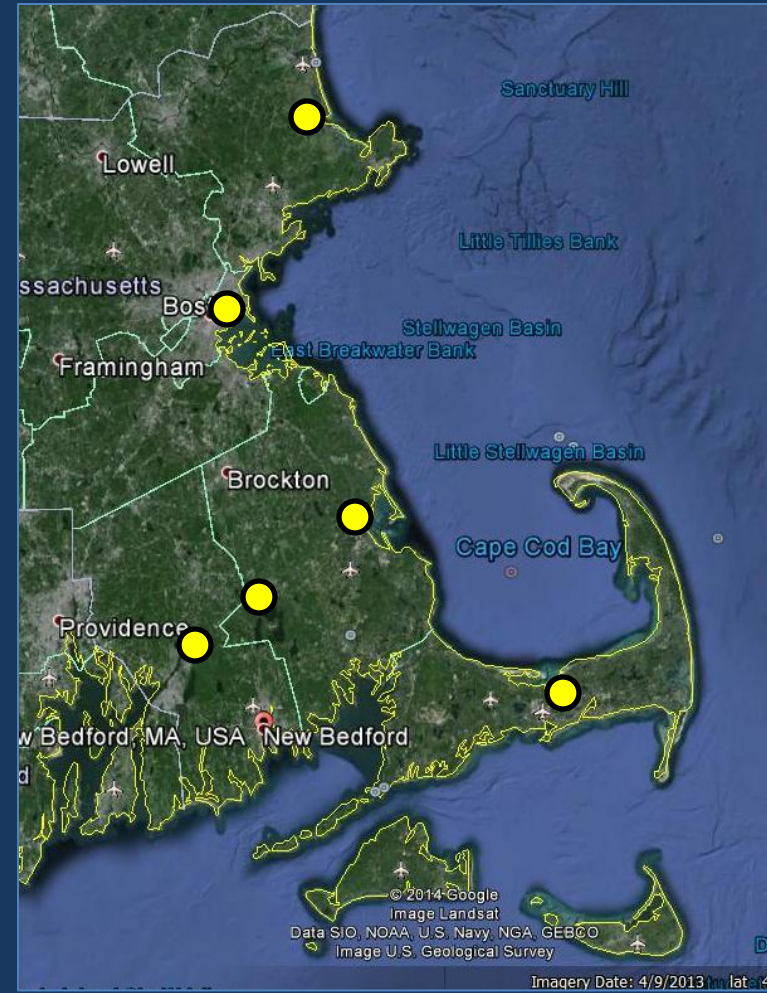
- Advantages
 - Species identification
 - Complete record of run
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- Disadvantages
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The Big Question

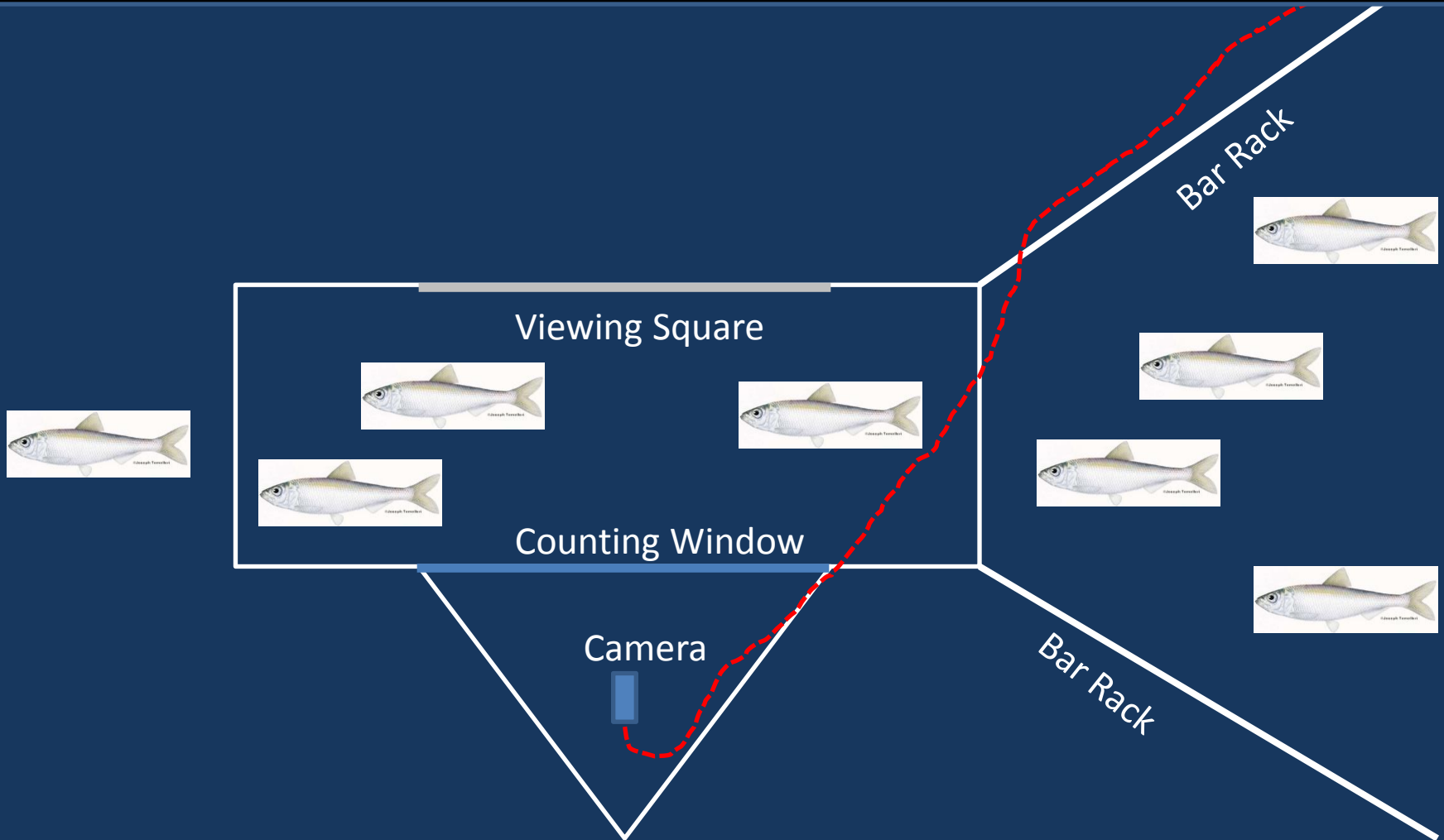
- Is video technology a viable option for monitoring river herring in Massachusetts?

Study Sites

- Parker River, Newbury
- Charles River, Boston
- Jones River, Kingston
- Nemasket River, Middleborough
- Mill River, Taunton
- Herring River, Harwich



Basic Setup



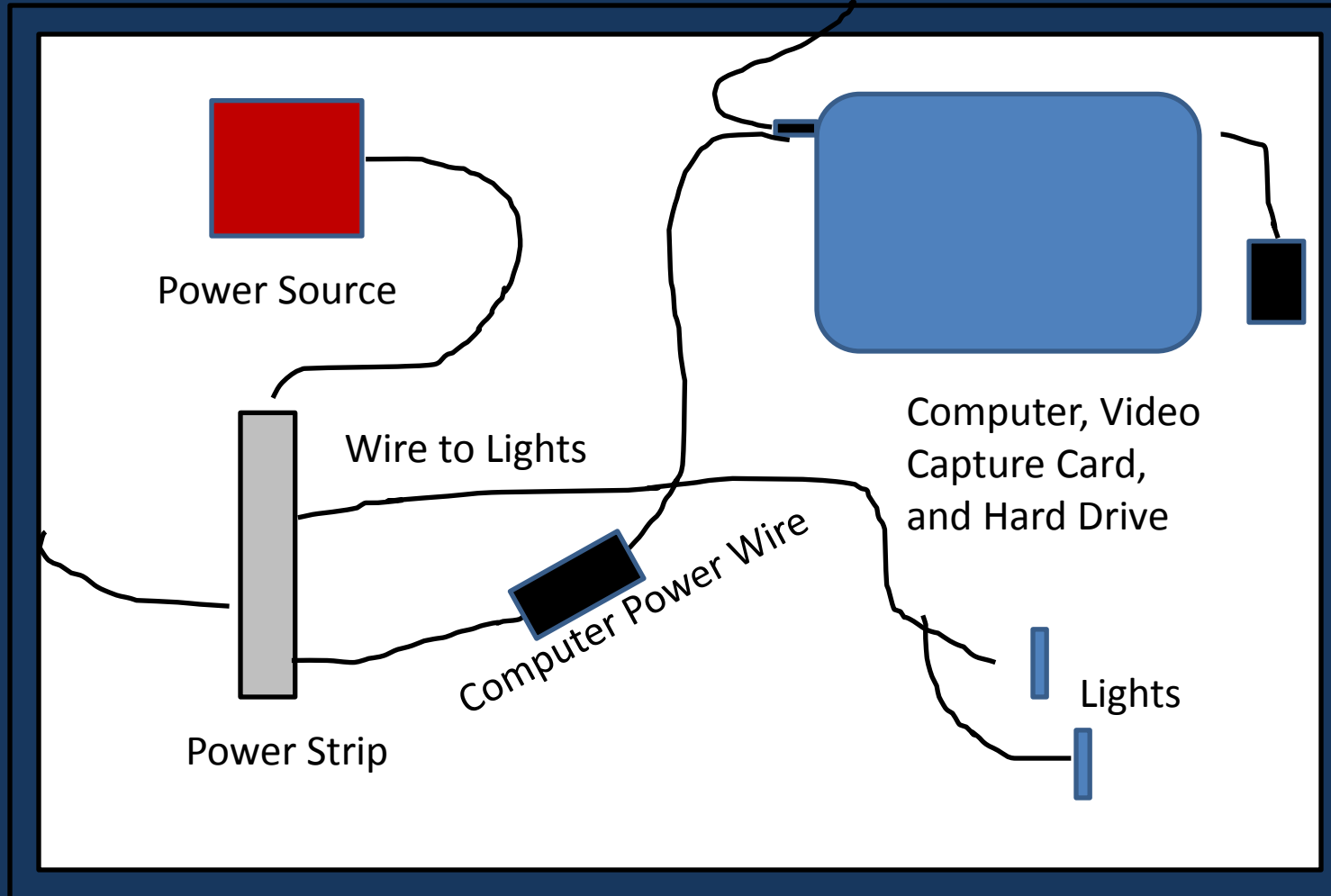
Introduction

Methods

Results

Conclusions

Basic Setup



Introduction

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Study Sites

Parker River, Newbury



Introduction

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Study Sites

Charles River, Boston



Introduction

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Mill River, Taunton



Introduction

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Nemasket River, Middleboro



Introduction

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Herring River, Harwich



Introduction

Methods

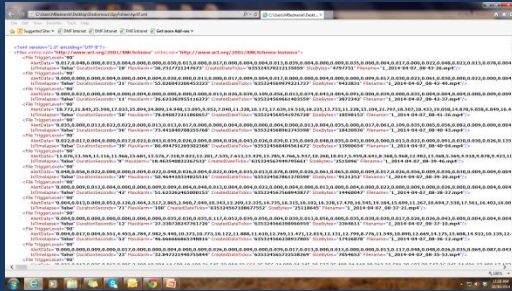
Results

Conclusions

Methods

- Video analyzed using Salmonsoft or iSpy
 - Processed video watched in entirety
 - iSpy available at www.ispyconnect.com
- Automatic counting via iSpy and R
 - Highly experimental!

Methods



```
Tinn R - [C:\Users\NBednar\K\Desktop\Diadromous\SpinyFishes\Uniba\Readn_2_11_14]
File Edit Format Search Options Tools View Window Web Help
R
Project | R card
Computer
R icon
Desktop
1 | #####
2 | #####This step reads the calibration file into R and prepares the #####
3 | #####
4 | #####
5 | #####
6 | dir.create("C:/Users/NBednar\K/Desktop/Week_2_12_14")
7 | setwd("C:/Users/NBednar\K/Desktop/Week_2_12_14")
8 | Data <- read.csv("C:/Users/NBednar\K/Desktop/Text/video/TOTFH/data.xml") ####Reads the data in
9 | day <- 14
10 | minute <- 5
11 | #####
12 | #####Need to define lines for the date file that is read in
13 | Entries <- nrow(Data)
14 | Useful <- Data[-c(1,Entries),1] ####Eliminates the junk at the top
15 | Useful #####Clipping off three from the bottom
16 | Date <- substring(Useful, 20, 29) ####Extracts Date
17 | Day <- as.numeric(substring(Date,9,10)) ####Extracts Day
18 | Month <- as.numeric(substring(Date,6,7)) ####Extracts Month
19 | Year <- as.numeric(substring(Date,1,4)) ####Extracts Year
20 | Time <- substring(Useful, 31,38) ####Extracts Time
21 | Hour <- as.numeric(substring(Time,1,2)) ####Extracts Hour
22 | Minute <- as.numeric(substring(Time,4,5)) ####Extracts Minute
23 | Second <- as.numeric(substring(Time,7,8)) ####Extracts
24 | Part1 <- substring(Useful, 150) ####Cut off info at the front part of each entry - Video
25 | Part2 <- sub(".*", "", Part1) ####Extracts relevant info after all the front part - Video
26 | PassageEvents <- length(Part2) #####Number of passage events observed
27 | Part3 <- strsplit(Part2, ",") ####Separates the file
28 | PassageVector <- 1:PassageEvents #####Length of file
29 | AUC <- vector(mode="numeric", length=PassageEvents) #####Empty vector for AUC
30 | Peak <- vector(mode="numeric", length=PassageEvents) #####Empty vector for peak
31 | Duration <- vector(mode="numeric", length=PassageEvents) #####Empty vector for duration
32 | Actual <- vector(mode="numeric", length=PassageEvents) #####Empty vector for recording passage
33 | YesNo <- vector(mode="numeric", length=PassageEvents) #####Empty vector for yes/no - false detections
34 | for (i in 1:PassageEvents) ####For loop to fill empty vectors for AUC, peak, duration
35 | {
36 |   Part4 <- Part3[i] #####Pulls out the first passage event. Will need a for loop to get everything taken care of.
37 |   #Part4
38 |   write.csv(Part4, "C:/Users/NBednar\K/Desktop/Junk.csv") ####Step 1 to get the numbers parsed into individual cells.
39 |   Part3 <- read.csv("C:/Users/NBednar\K/Desktop/Junk.csv") ####Step 2 to get the numbers parsed into individual cells.
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995 |   #####
996 |   #####
997 |   #####
998 |   #####
999 |   #####
1000 |   #####
```

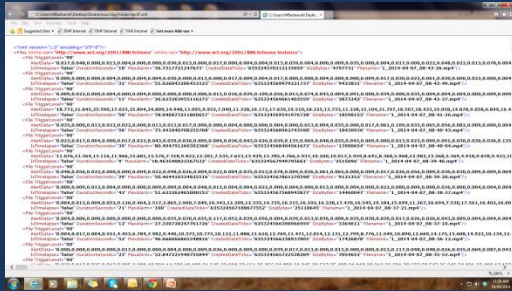
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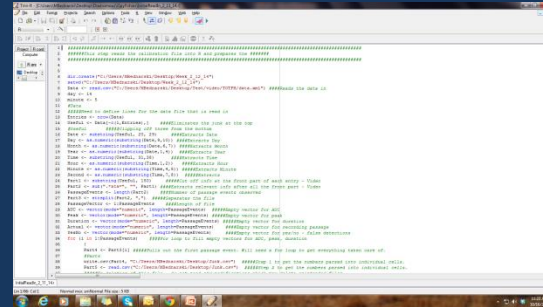
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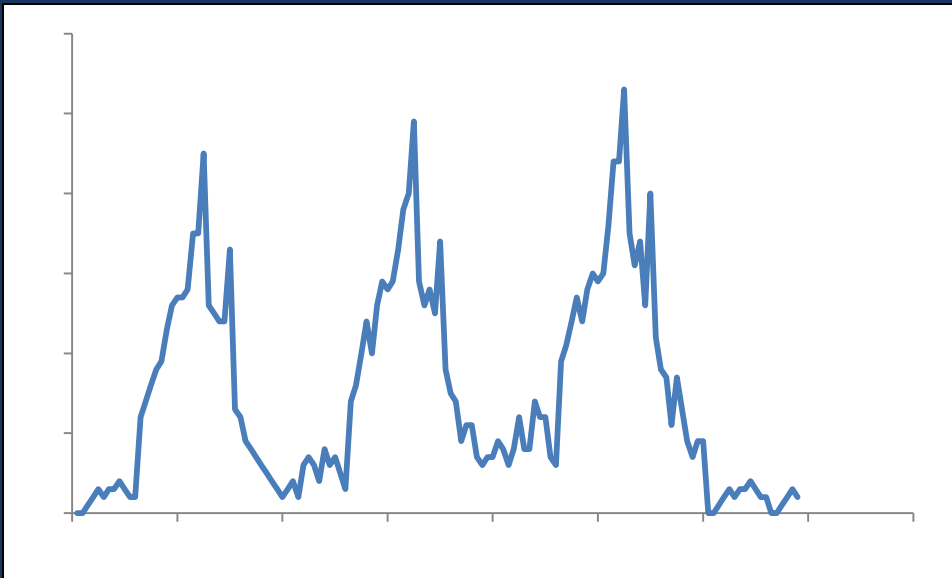
Methods



```
#!/bin/bash
# Script for data processing
# ...
# ...
# ...
```



```
#!/bin/bash
# Script for data processing
# ...
# ...
# ...
```



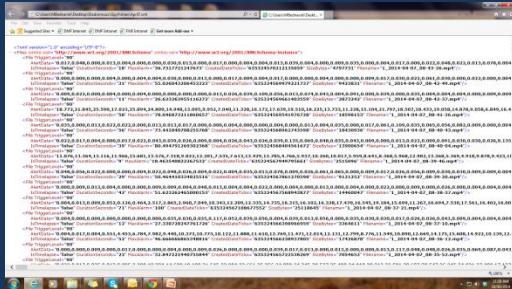
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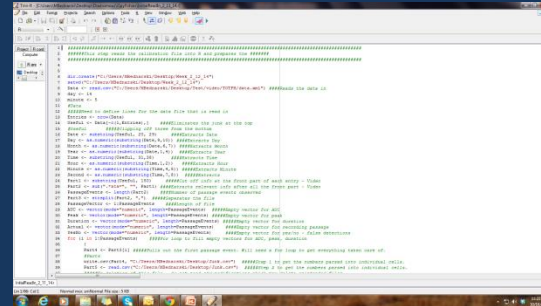
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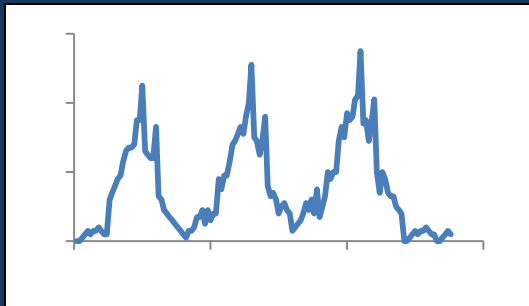
Methods



A screenshot of a text editor window displaying a large amount of raw data, likely a chromatogram or mass spectrum output. The data consists of many lines of text, each containing numerical values and some alphanumeric characters, representing the results of a measurement or simulation.



A screenshot of a text editor window showing the same data as the first screenshot, but with significant processing and analysis applied. The data is now organized into sections with comments, likely describing the analysis steps, results, and conclusions. The text is more structured and easier to read than the raw data.



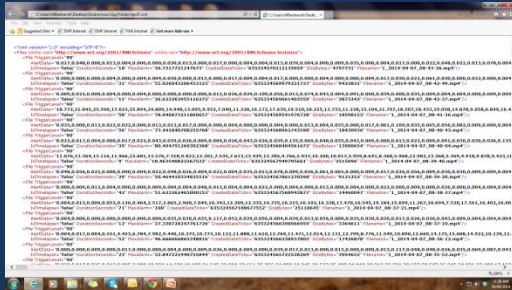
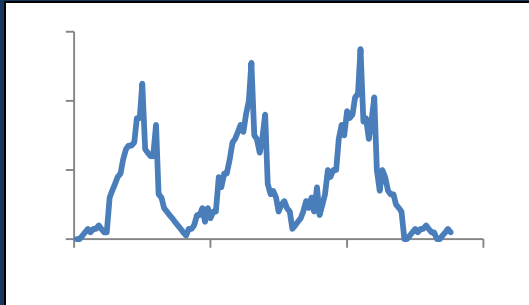
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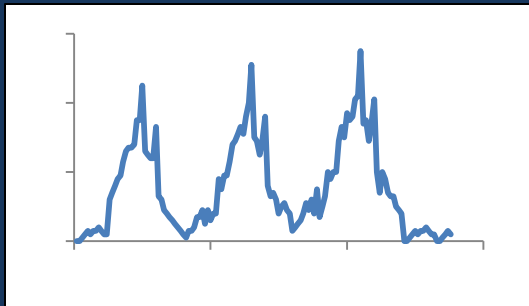
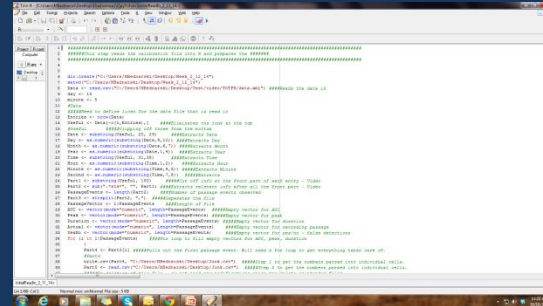
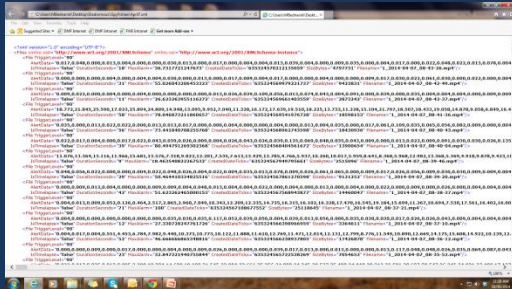
Methods

A screenshot of a code editor showing R code. The code includes comments and function calls, likely related to data analysis or visualization. The code is written in a dark-themed editor.

$$y = \beta_0 + \beta_1 + \beta_2 + \beta_3 + \epsilon$$



Methods



$$y = \beta_0 + \beta_1 + \beta_2 + \beta_3 + \epsilon$$

↓
N

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Results – Parker River

FPS: 21.52 5/16/2014 2:43:16 AM



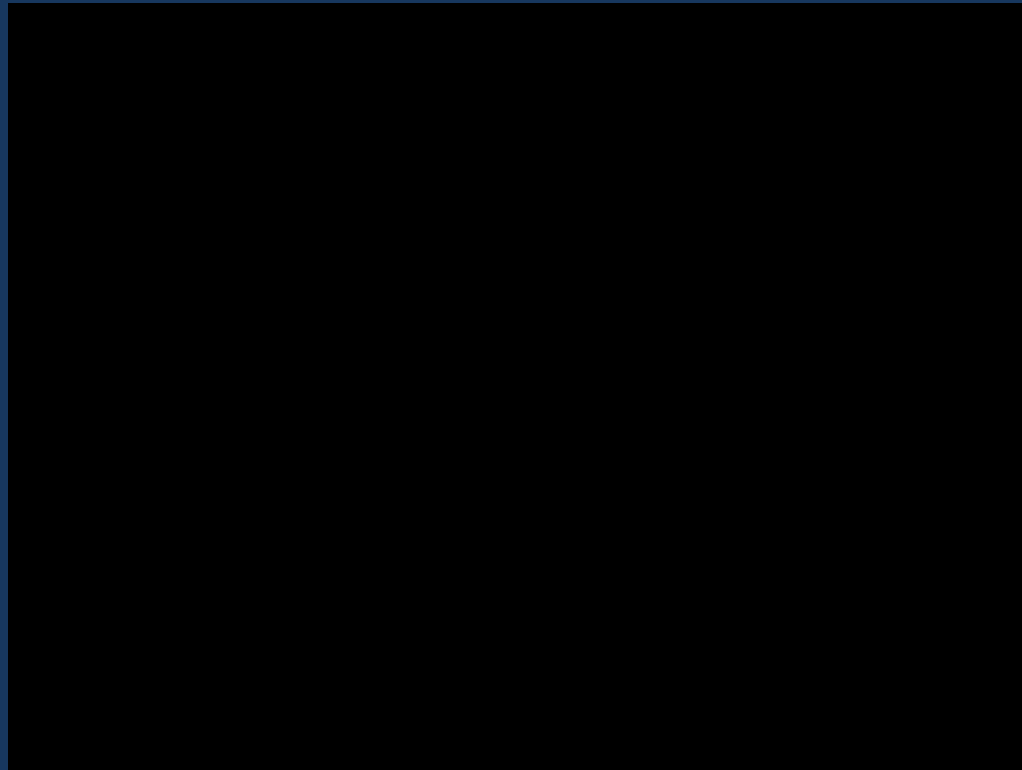
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Results – Jones River



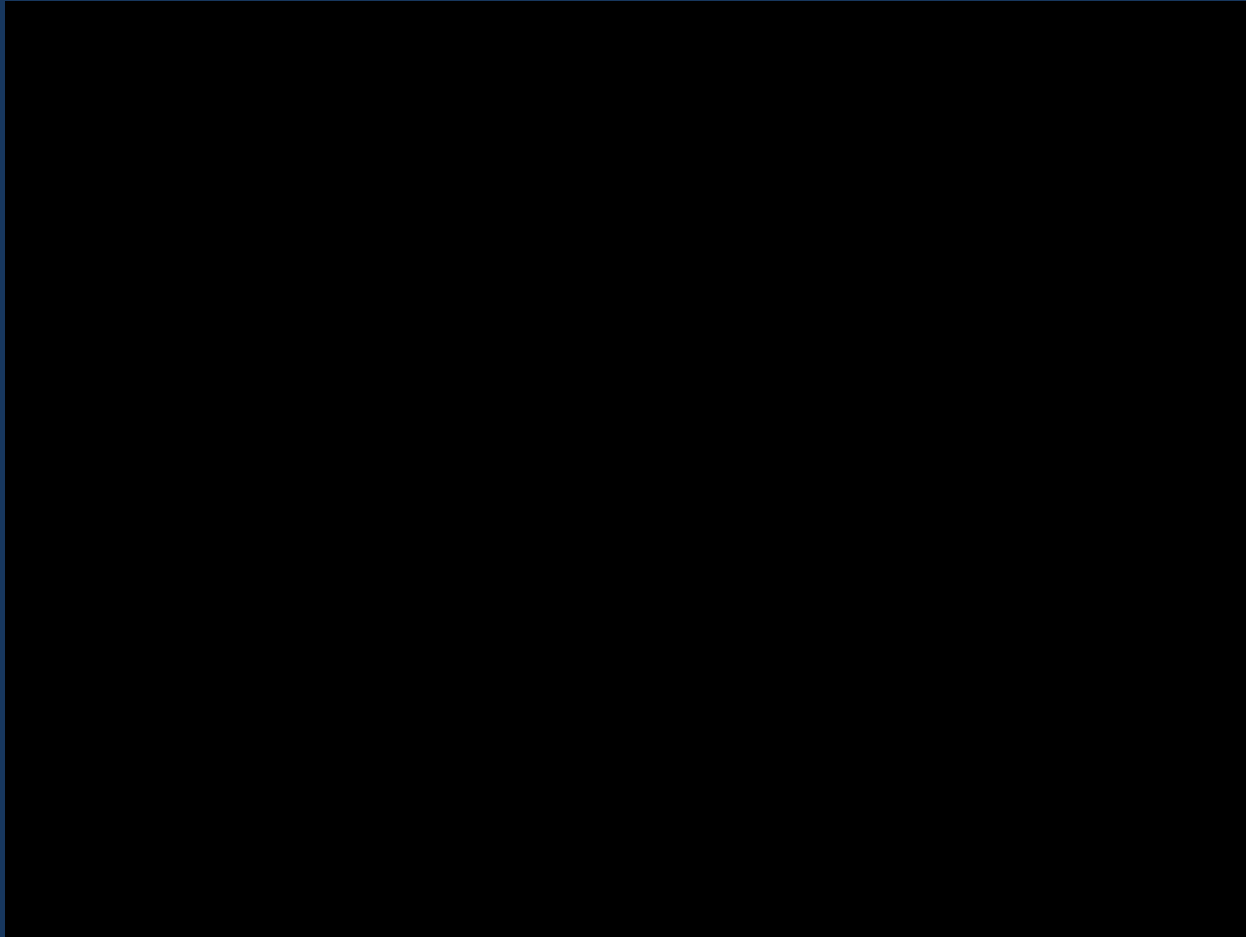
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Results – Mill River



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Results – Charles River

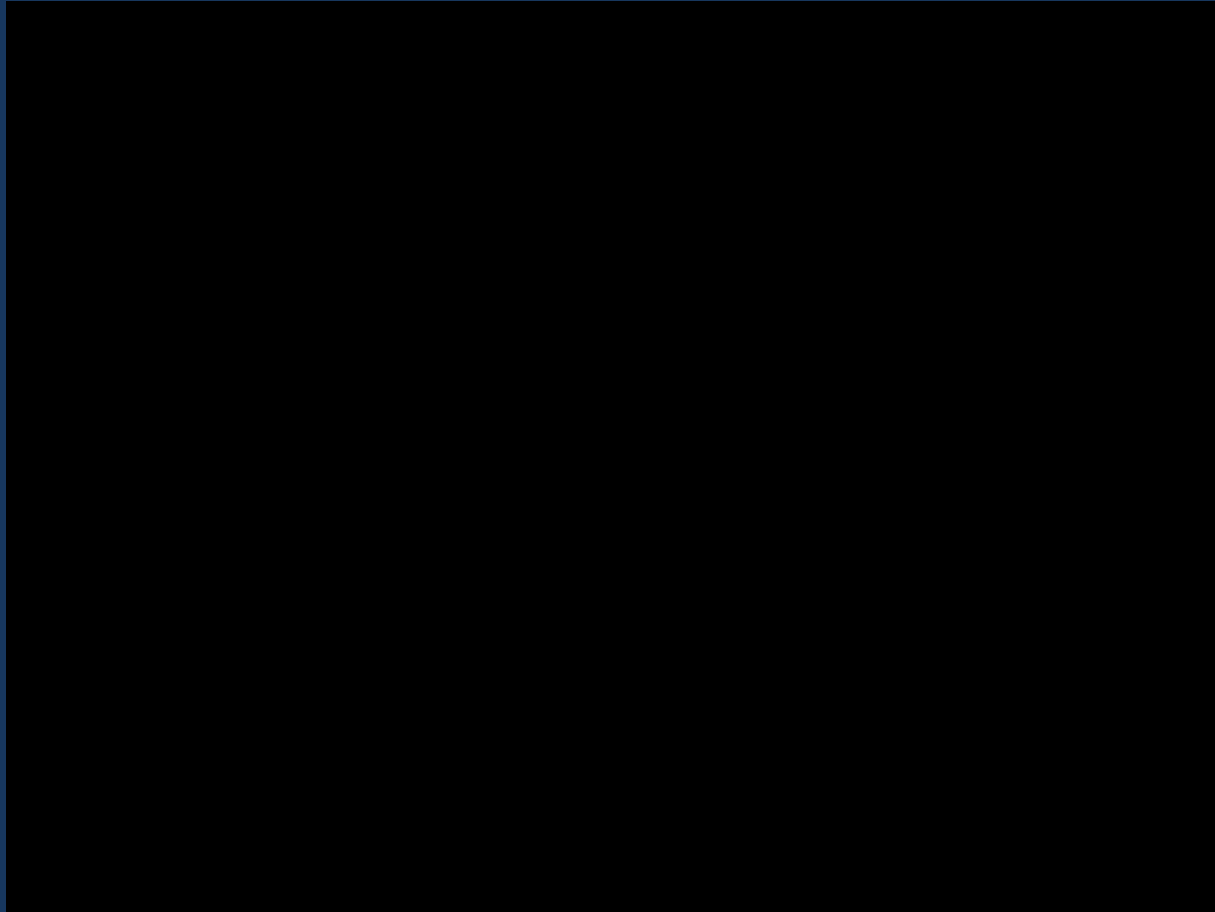
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Results – Nemasket River



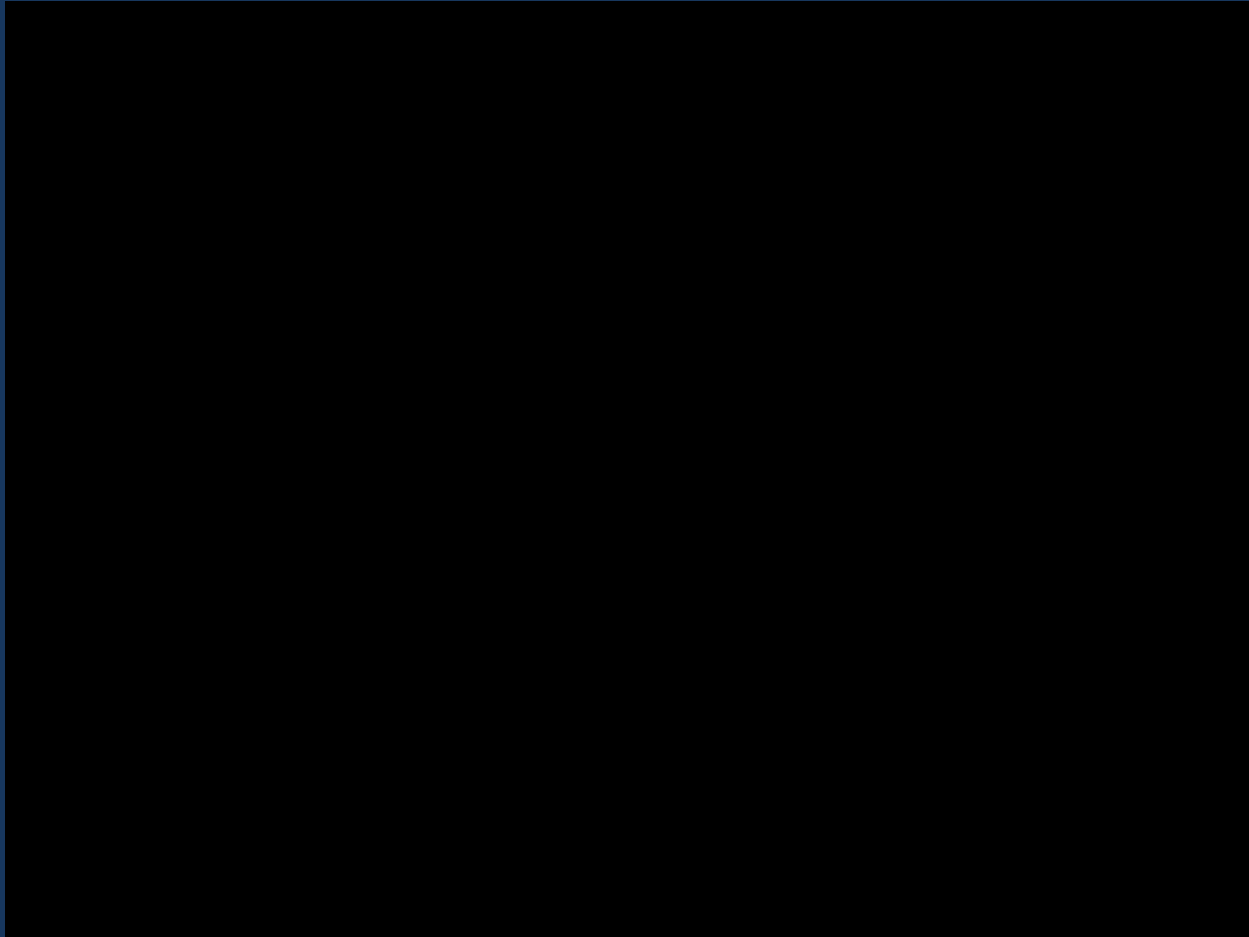
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Results – Herring River



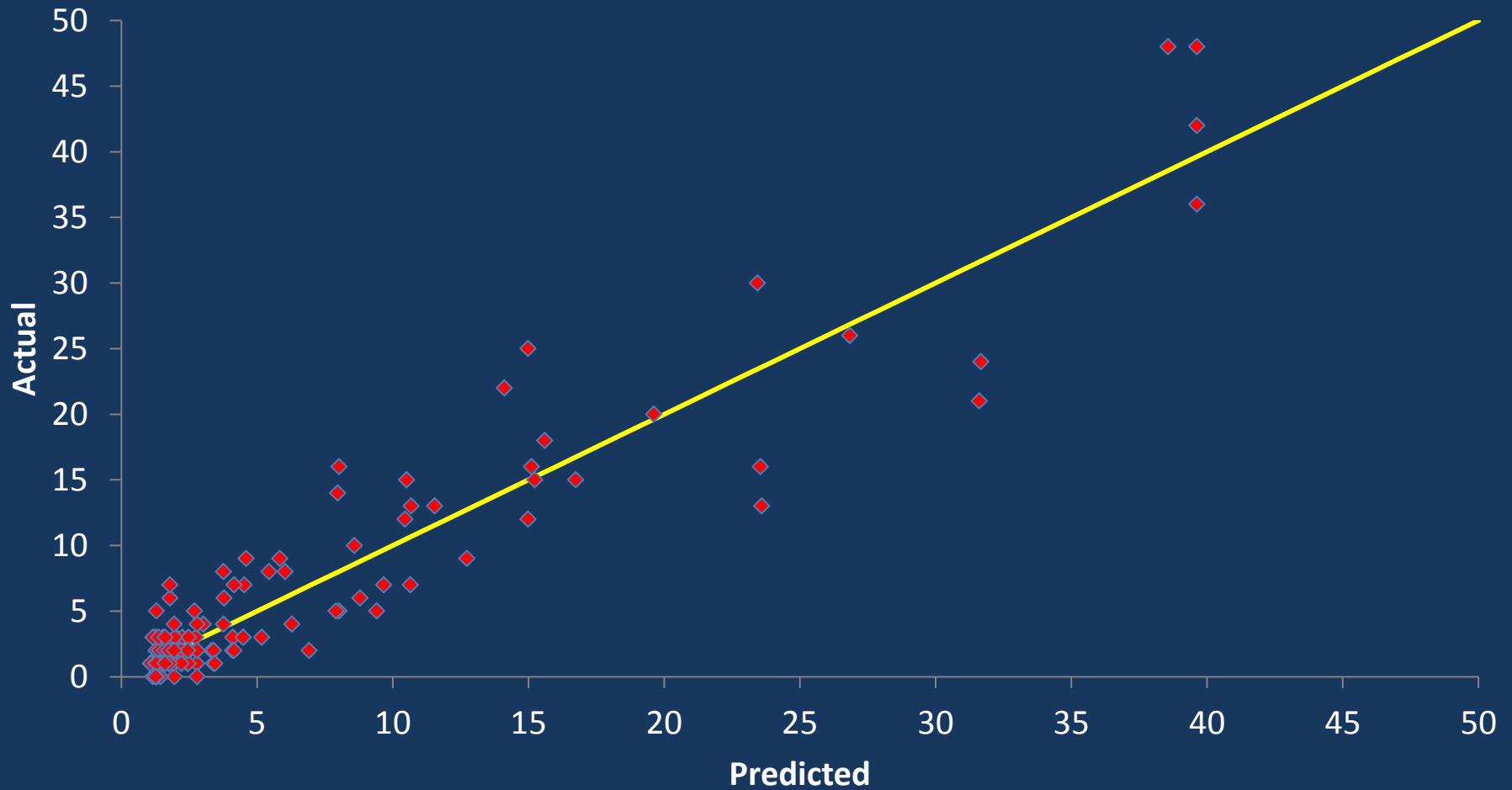
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Results – Nemasket River

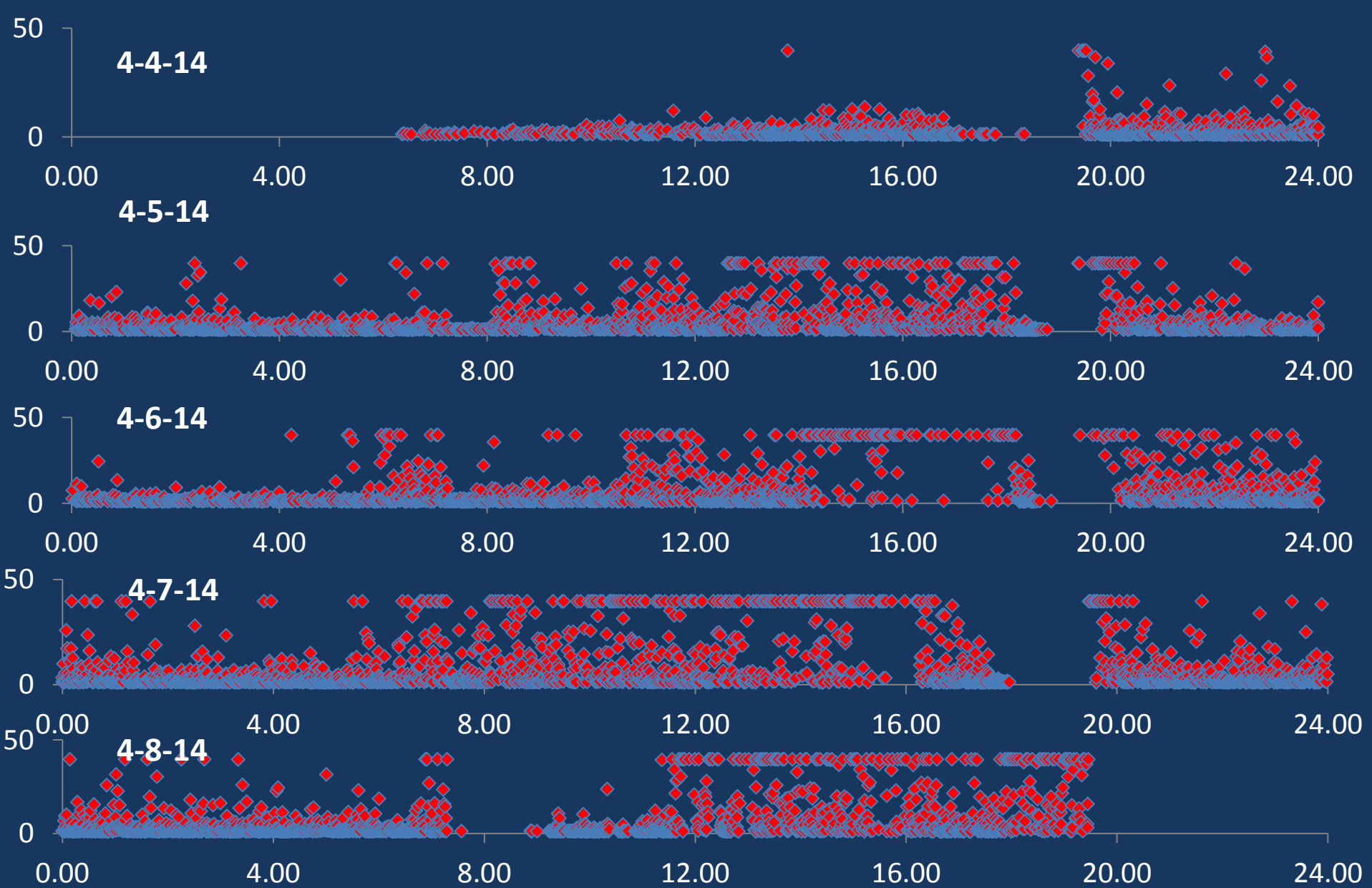


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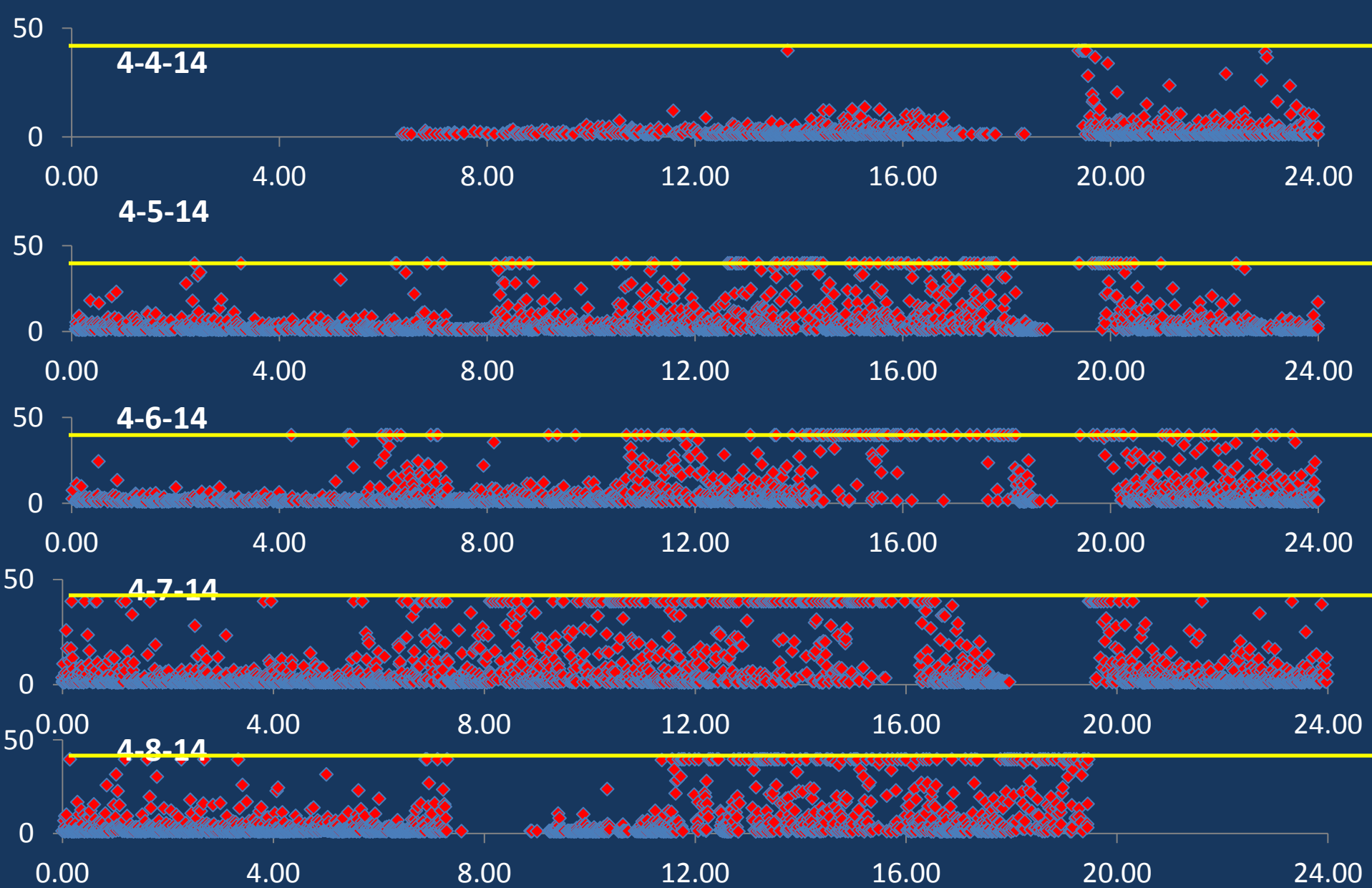


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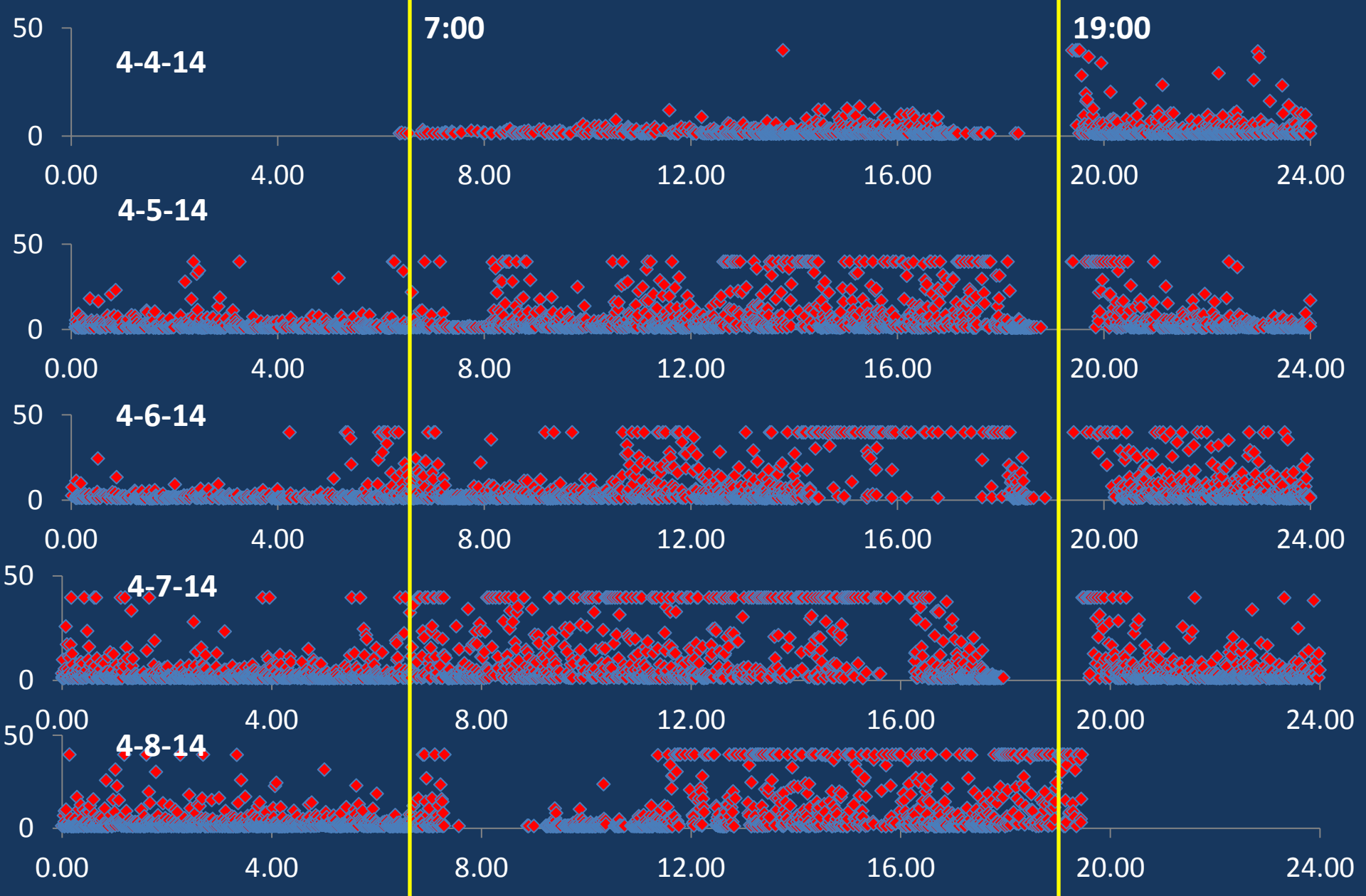


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Conclusions

- Video systems a viable option for assessing river herring runs
- Video systems provide can provide very fine scale information about a river herring run
- Automated counting shows promise

Conclusions

- HOWEVER, video systems have critical limitations
 - Information quantity – 200-500 GB of video
 - Data processing – See above!!!!
 - Maintenance – Daily, Tuning
 - Cost - \$4-10,000

Conclusions

- What are your objectives?
- Involvement – Volunteer Counting
- Outreach – Volunteer Counting, Video System
- Management/Monitoring – Volunteer Counting, Electronic Counter, Video Counting
- Research – Video Counting

Conclusions

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- **Research** – Video Counting

Acknowledgements

- Ed Clark and Mike Trainor
- The Nature Conservancy
- Jones River Watershed Association
- Massachusetts Division of Ecological Restoration
- Middleborough-Lakeville Herring Fishery Commission
- Town of Harwich

