



Florida Department of Environmental Protection

The Effects of Water Level on the Florida Stream Condition Index

March 2016





Study Rationale

This study originated from discussions during the 2010 review of the Florida Stream Condition Index (SCI). One goal was to improve the application of the method during changing hydrologic conditions.

DEP SOP SCI 1000 contains provisions that:

- 2.2.1. If water velocity is less than 0.5 m/s, do not sample. If water level and flow is very low but stream is not completely dry, postpone sampling until the stream has maintained a minimum of 0.5 m/s velocity for at least 28 days.
- 2.2.2 If desiccation has occurred and the stream has gone *completely* dry with no refugia for aquatic organisms, postpone sampling for a minimum of 6 months (180 days) after dry conditions have abated.

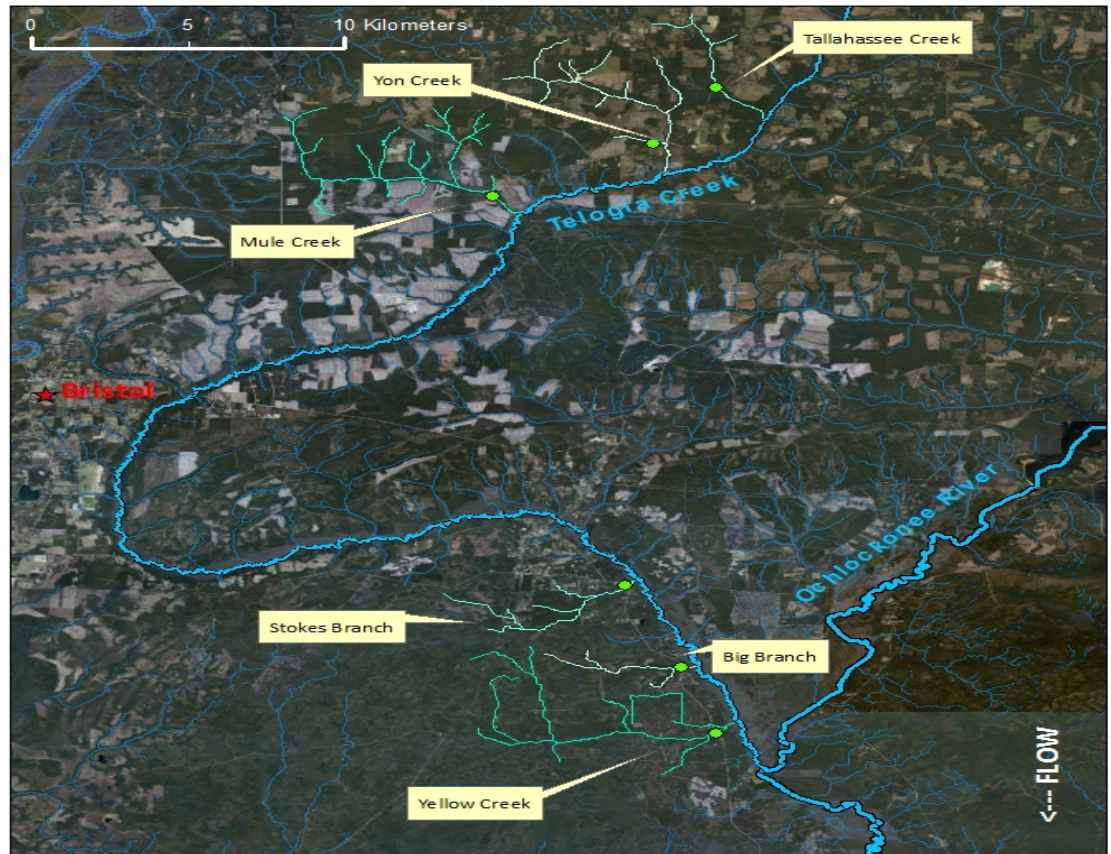
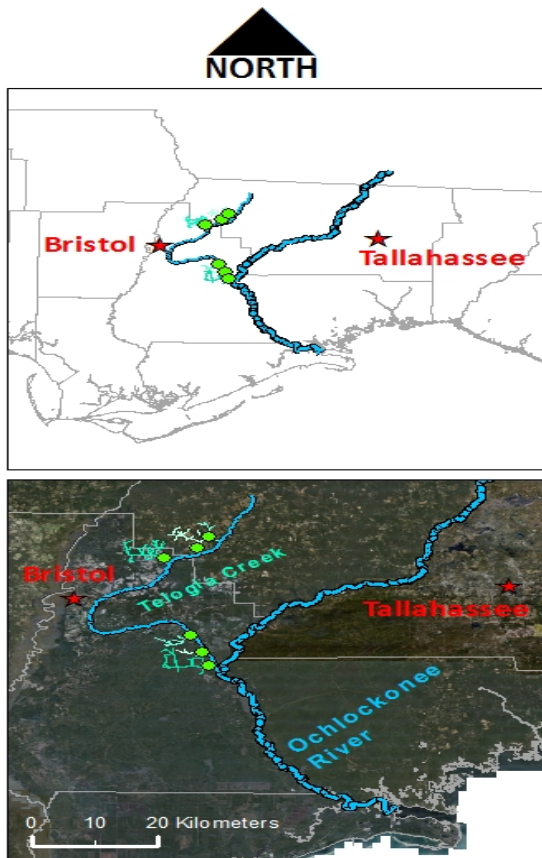


Study Methods

- Six Telogia Creek tributary stream sites selected near the USGS gage station at Bristol, Florida.
- SCI samples were collected monthly from October 2012 through January 2016.
- Water physicochemical parameters were recorded and stream discharge was measured with a SonTek Flow Tracker during each sampling event.
- Water chemistry was collected every other month.



Study Sites

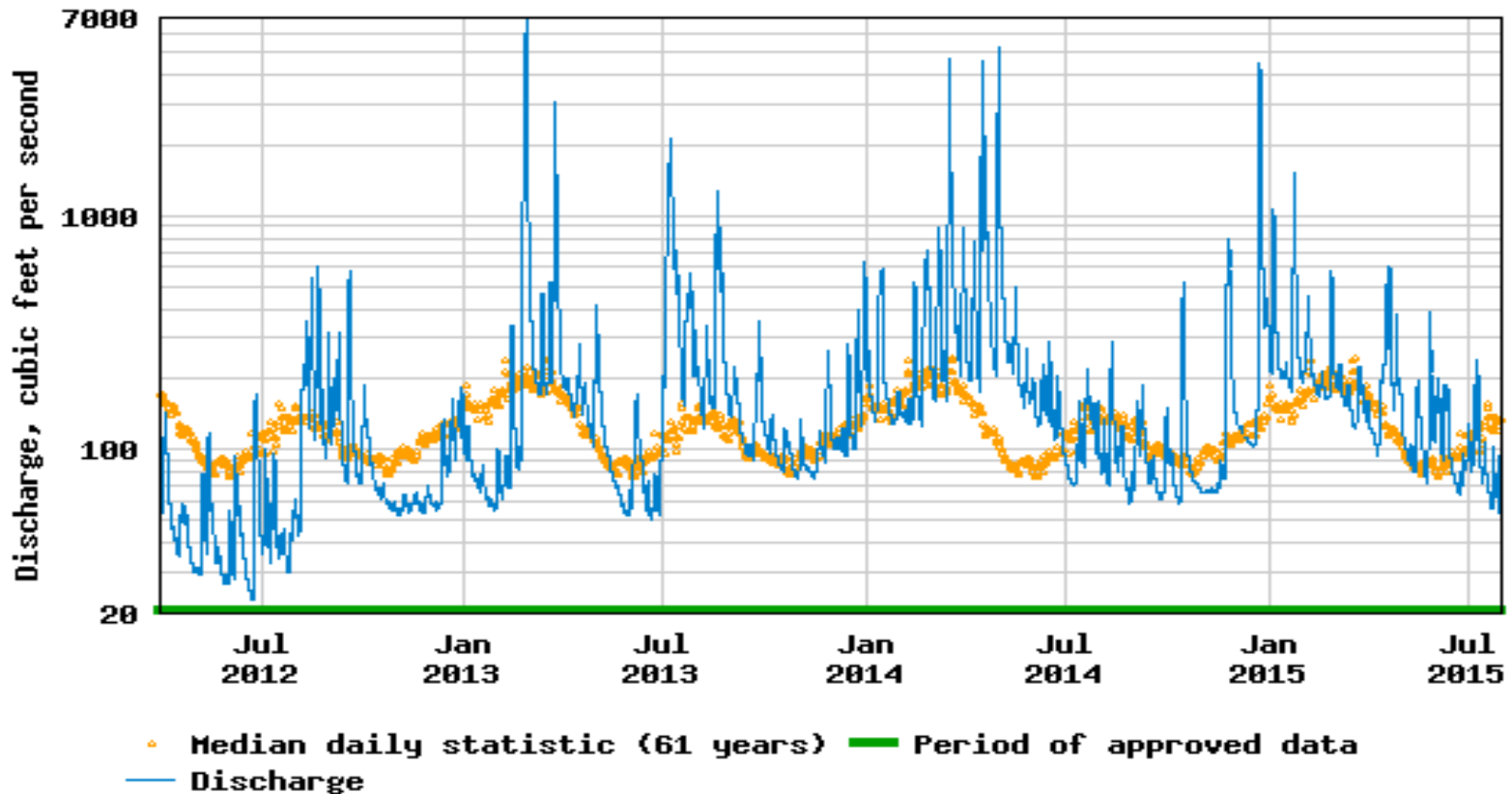




Telogia Creek Discharge April 2012 – July 2015

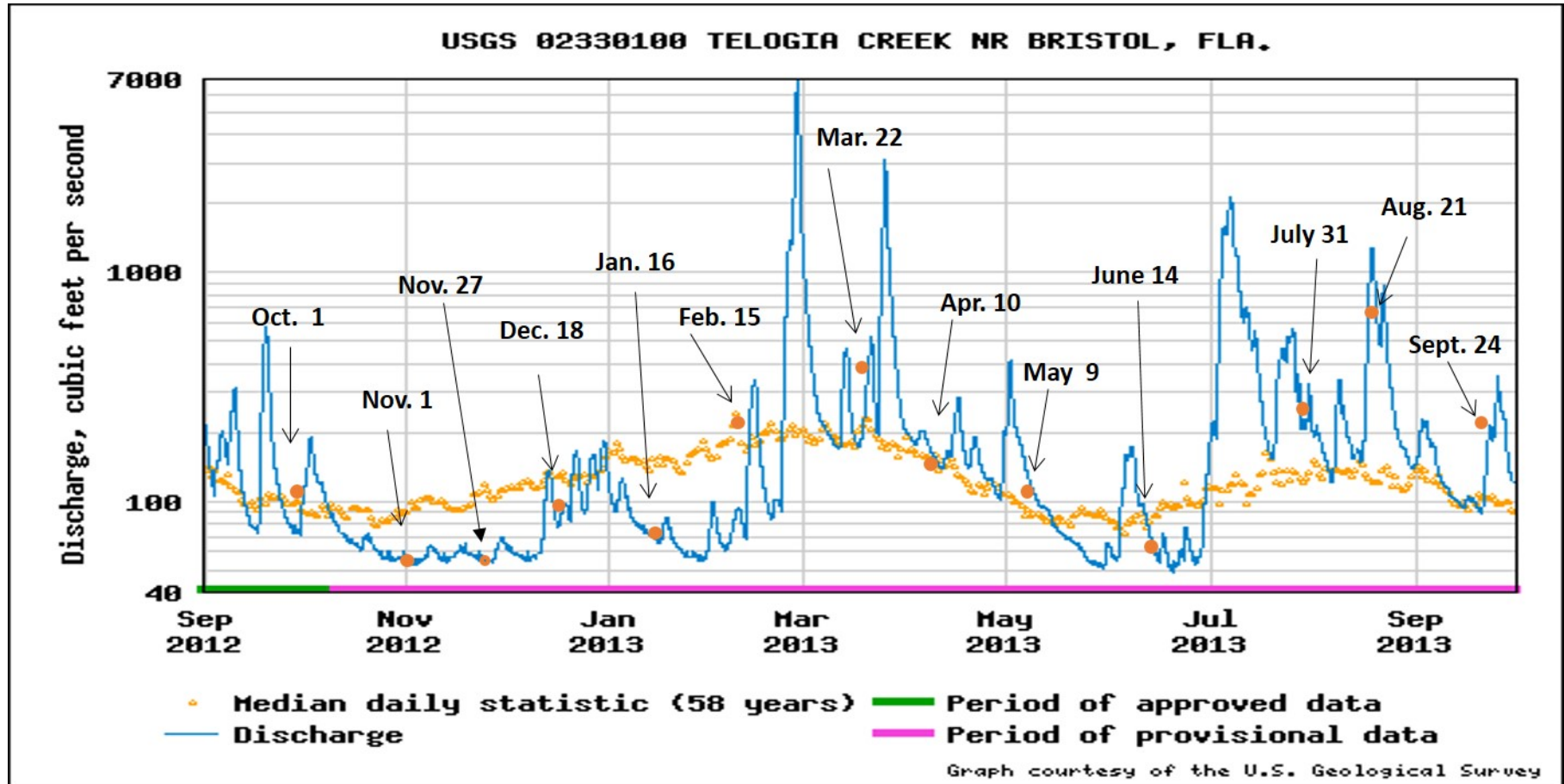


USGS 02330100 TELOGIA CREEK NR BRISTOL, FLA.



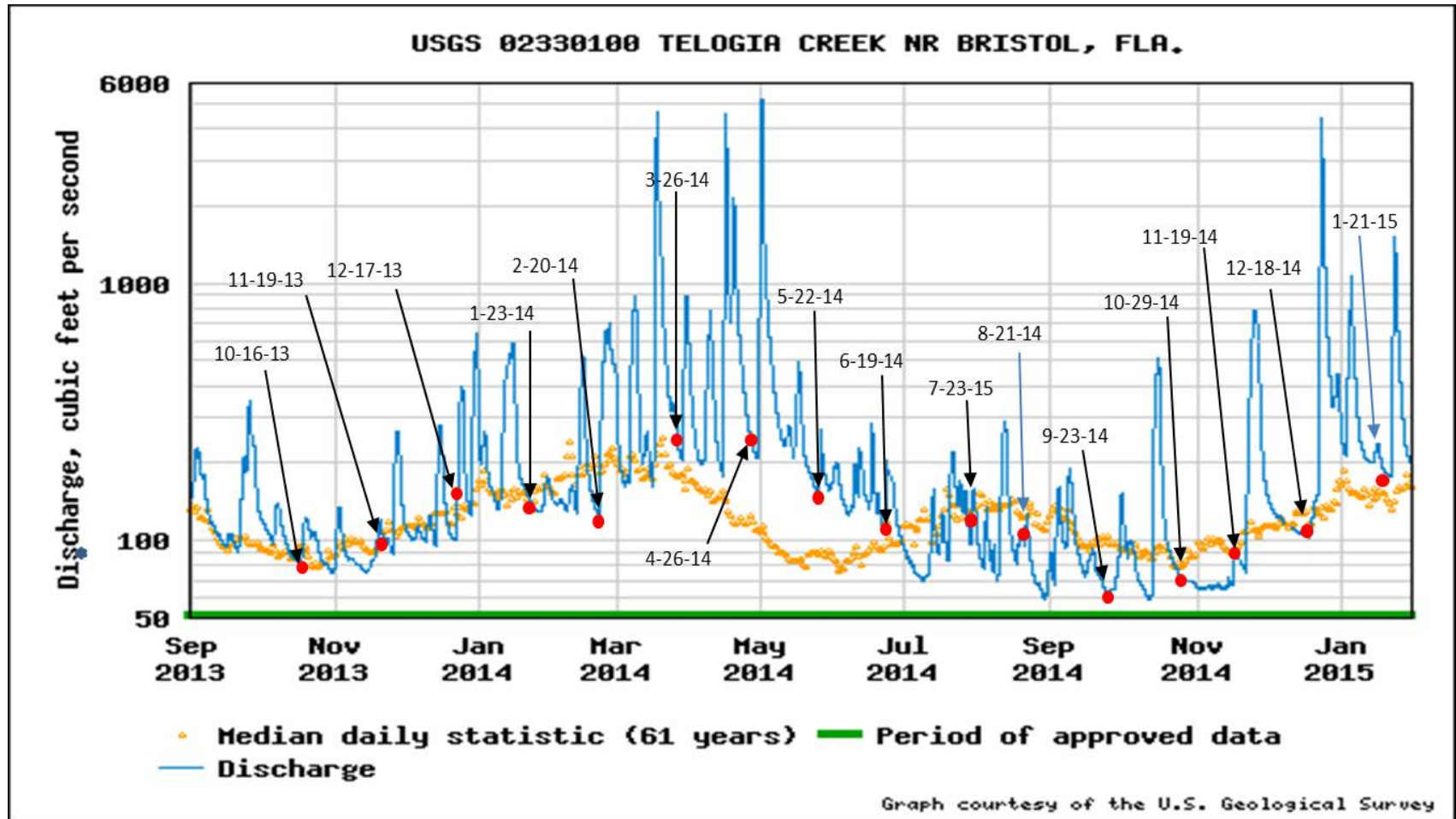


Sampling Dates and Telogia Creek Discharge Oct 2012 - Sept 2013





Sampling Dates and Telogia Creek Discharge Sept 2013 – Jan. 2015





Flow Measurements with the SonTek FlowTracker



Parameter recorded for Flow:

- 1) RP: Reference point - fixed point usually from bridge
- 2) *CFS*: Cubic feet / sec
- 3) Mean depth
- 4) Stream width
- 5 Mean Velocity m/s



Flow measurements with the SonTek FlowTracker





Stokes Branch at Low Flow discharge = 0.49 cfs





Stokes Br at High Flow 3/18/14





Stokes Br at High Flow 3/18/14





Stokes Branch at Low Flow

Discharge = 0.49 cfs





Yellow Creek at Low Flow

Discharge = 2.01 cfs





Yellow Cr. 1 Oct. 2012 Discharge = 10.3 cfs RP = 16.64 ft





Yellow Creek at High Flow 3/18/14

RP = 11.91 ft





Yellow Creek at High Flow

3/18/2014 RP = 11.91 ft





Yellow Creek 5/22/2014

Discharge = 4.4 cfs RP = 15.96 ft





Yon Creek at High Water 3/18/14





Yon Creek at High Water 3/18/14

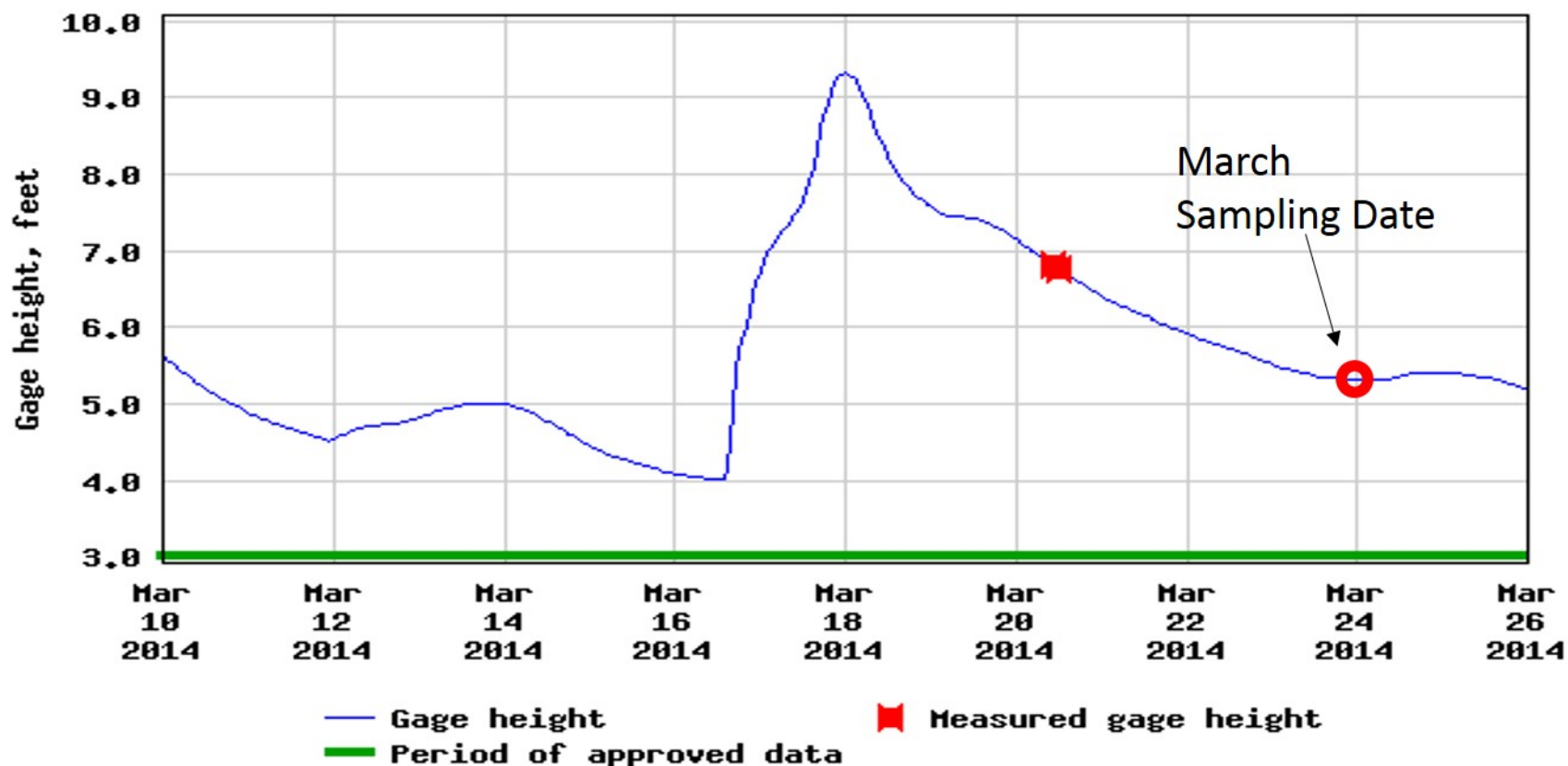




March 2014 Sampling Day - Six Days after High Water



USGS 02330100 TELOGIA CREEK NR BRISTOL, FLA.





SCI Summary Table

Site	Date range	N	Velocity (m/s) Mean (range)	SCI score Mean (range)	% SCI < 35	% SCI 36 to 64	% SCI > 65	# change >20 points consecutively
Tallahassee Creek	11/12 - 1/15	21	0.19 (0.02-0.30)	27 (1-52)	67	33	0	2
Yon Creek	11/12 - 1/15	21	0.25 (0.16-0.38)	77 (52-90)	0	10	90	3
Mule Creek	11/12 - 1/15	21	0.29 (0.20-0.38)	76 (60-89)	0	10	90	0
Stokes Branch	10/12 - 7/15	23	0.13 (0.03-0.66)	63 (47-76)	0	61	39	2
Big Branch	10/12 - 7/15	23	0.08 (0.01-0.17)	60 (51-78)	0	87	13	0
Yellow Creek	10/12 - 7/15	20	0.15 (0.02-0.38)	58 (29-72)	10	50	40	5



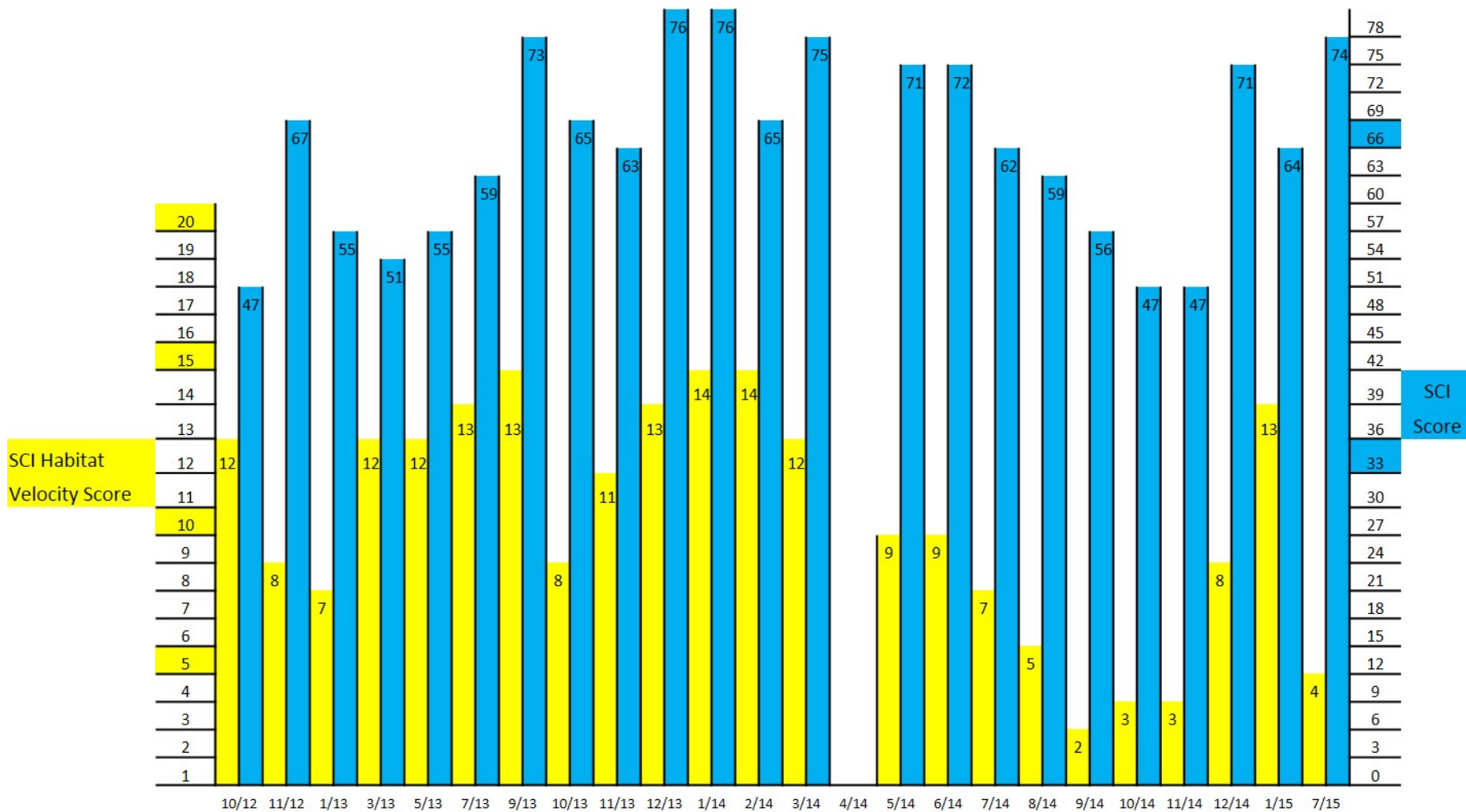
Water Chemistry Summary Table

Compound	Big Br Mean (Range)	Stokes Br Mean (Range)	Yellow Cr Mean (Range)	Mule Cr Mean (Range)	Yon Cr Mean (Range)	Tallahassee Br Mean (Range)
Turbidity (NTU)	6.26 (1.7-17)	3.65 (1.9-6.5)	4.11 (2.0-7.2)	1.5 (-3.8)	3.94 (1.2-6.5)	6.4 (2.9-12)
Chloride (mg C/L)	3.23 (2.4-4.2)	9.3 (6.1-18)	4.08(3.1-5.4)	2.75 (2.2-3.6)	4.51 (3.5-6.0)	8.59 (7.4-10.0)
Sulfate (mg SO4/L)	0.86 (0.58-1.4)	77.5 (19-170)	0.80 (0.37-14)	1.43 (1-2.3)	1.15 (0.85-1.6)	0.82 (0.5-1.5)
Color (True) (PCU)	194.1 (73-320)	123.9 (40-230)	277 (86-450)	127.4 (77-320)	105.1 (58-230)	75.1 (40-120)
Alkalinity (Mg CaCO3/)	14.76 (2.7-29)	78.1 (26-131)	19.6 (1.4-51)	0.88 (0.65-1.6)	1.68 (0.65-3.1)	10.1 (9.4-12)
TDS (mg/L)	53.38 (38-68)	254.4 (116-441)	75.25 (48-100)	31.0 (18-71)	33.75 (18-45)	52.25 (43-61)
TSS (mg/l)	17.25 (2-86)	5.5 (2-10)	5.75 (2-17)	5.25 (2-8)	5.25 (2-9)	7.87 (2-15)
Fluoride (mg F/L)	0.035 U (0.035)	0.123 (0.052-0.067)	0.037 (0.035-0.067)	0.037 (0.035-0.047)	0.057 (0.043-0.071)	0.063 (0.057-0.067)
Specific Cond (umhos/cm)	46.7 (32-71)	344 (123-626)	62 (31-117)	24.6 (18-43)	31.9 (26-36)	64.1 (60-68)
O-Phosphate-P (mg P/L)	0.004 I (0.004)	0.025 (0.01-0.048)	0.004 (0.004-0.005)	0.019 (0.012-0.023)	0.077 (0.062-0.089)	0.029 (0.019-0.051)
Ammonia-N (mg N/L)	0.008 (0.002-0.016)	0.010 (0.002-0.023)	0.007 (0.002-0.016)	0.007 (0.002-0.012)	0.016 (0.002-0.033)	0.021 (0.003-0.033)
TKN (mg N/L)	0.51 (0.31-0.74)	0.49 (0.31-0.68)	0.64 (0.38-0.90)	0.38 (0.20-0.88)	0.42 (0.26-0.86)	0.42 (0.26-0.58)
Organic C (mg C/L)	16.34 (6.8-27)	15.88 (8.9-28)	24.5 (11-37)	11.49 (6-29)	9.86 (4.7-24)	6.99 (4.1-11)
Calcium (mg/L)	8.09 (4.98-12.2)	52.31 (16-103)	10.80 (4.1-20)	1.54 (0.87-1.69)	1.81 (1.44-4.48)	3.74 (3.17-4.48)
Magnesium (mg/L)	0.64 (0.39-0.97)	6.86 (2.33-12.8)	0.89 (0.41-1.77)	0.65 (0.47-0.93)	1.02 (0.81-1.22)	2.77 (2.49-2.94)
Sodium (mg/L)	1.88 (1.4-2.4)	10.13 (5.7-19)	2.40 (1.8-3.3)	1.51 (1.3-1.9)	2.20 (1.7-2.7)	3.74 (3.1-4.4)
Zinc (ug/L)	5 U	5 U	5 U	5 U	5 U	5 U
Arsenic (ug/L)	0.40 (0.25-0.57)	0.91 (0.6-1.33)	0.40 (0.33-0.55)	0.26 (0.25-0.32)	0.41 (0.33-0.55)	0.62 (0.40-0.84)
Cadmium (ug/L)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Chromium (ug/L)	0.49 (0.3-0.79)	0.86 (0.35-1.5)	0.66 (0.3-0.6)	0.36 (0.3-0.92)	0.51 (0.3-0.92)	0.56 (0.3-0.77)
Copper (ug/L)	0.50 U (0.50-0.52)	1.26 (0.5-3.87)	0.50 U	0.50 U	0.50 U	4.22 (1.77-8.91)
Lead (ug/L)	0.48 (0.20U-0.70)	0.40 (0.20U-0.62)	0.57 (0.2 U-1.16)	0.56 (0.2U-2.2)	0.31 (0.2U-0.57)	0.40 (0.2U-0.64)



Stokes Branch

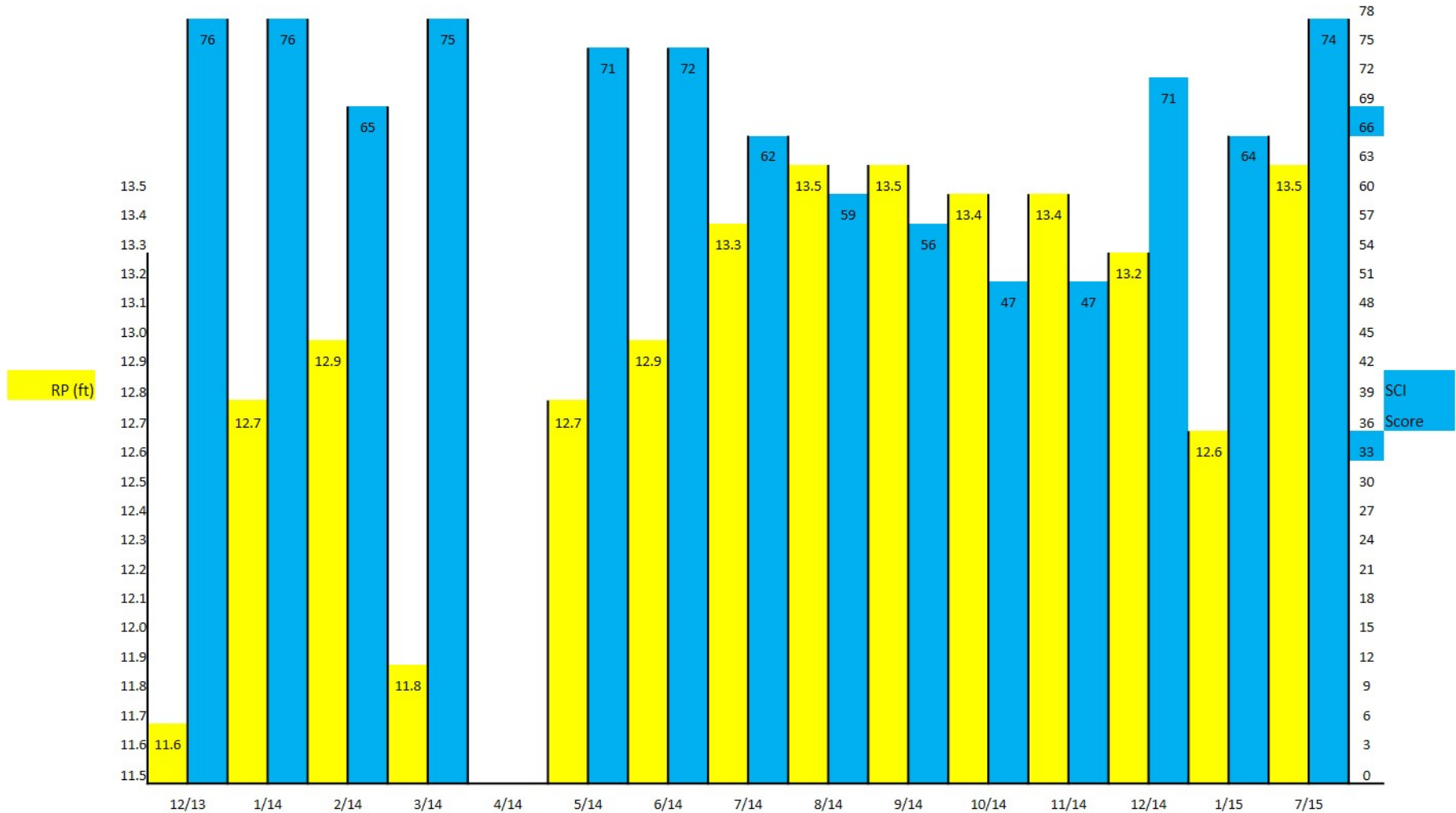
Habitat velocity vs. SCI, $r = 0.3321$





Stokes Branch

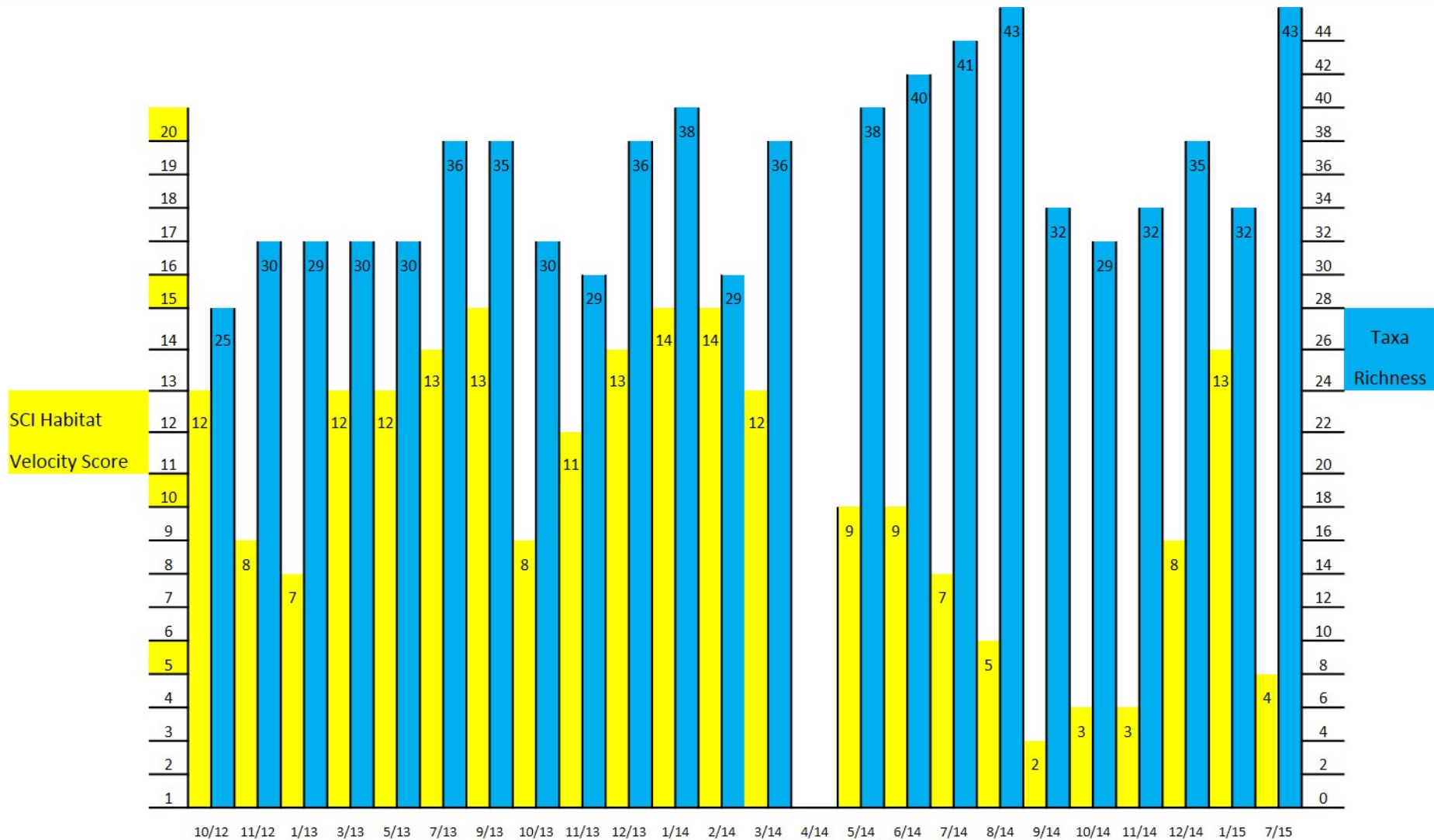
RP (ft) vs. SCI, $r = -0.6247$





Stokes Branch

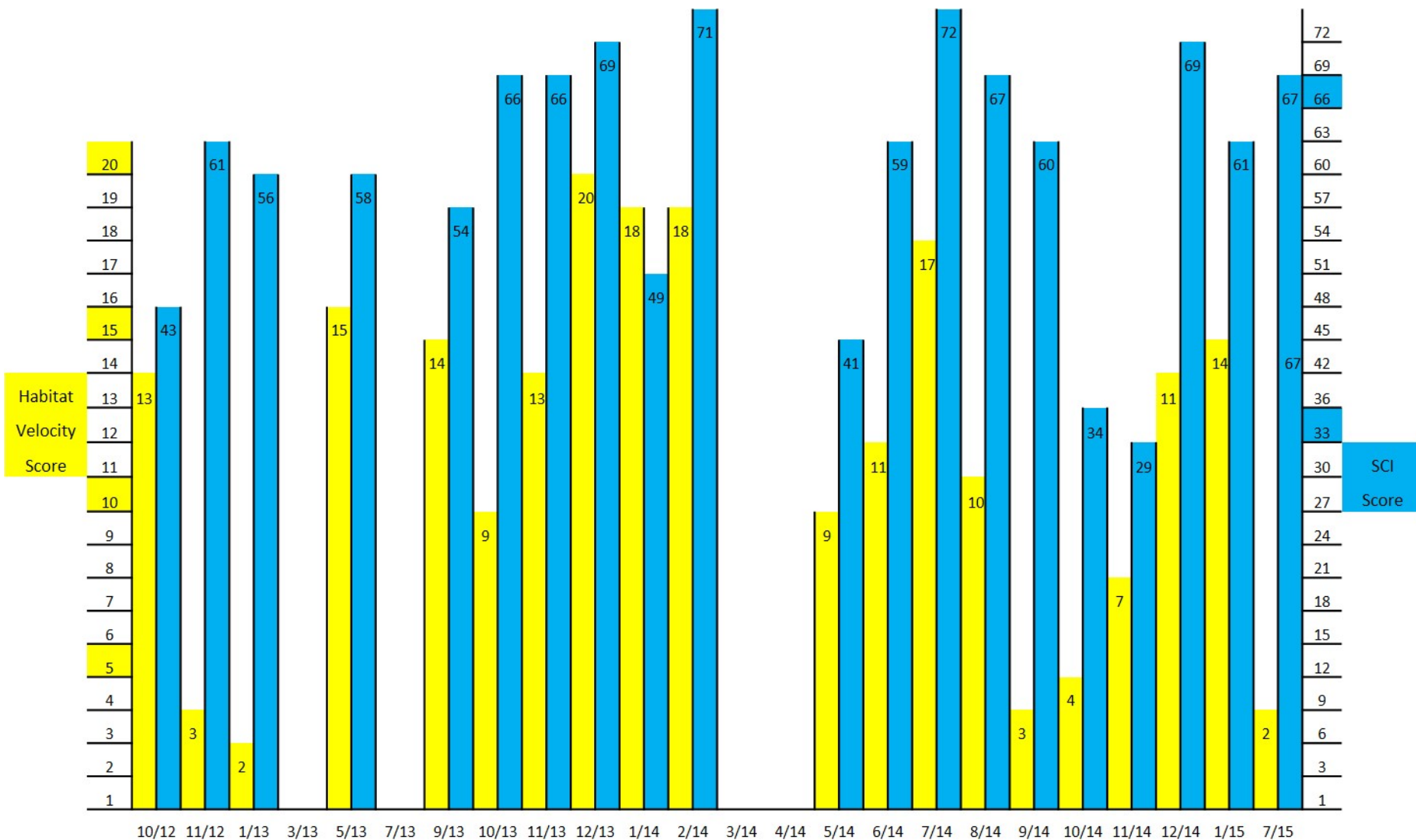
Habitat velocity vs. Taxa richness, $r = 0.1634$





Yellow Creek

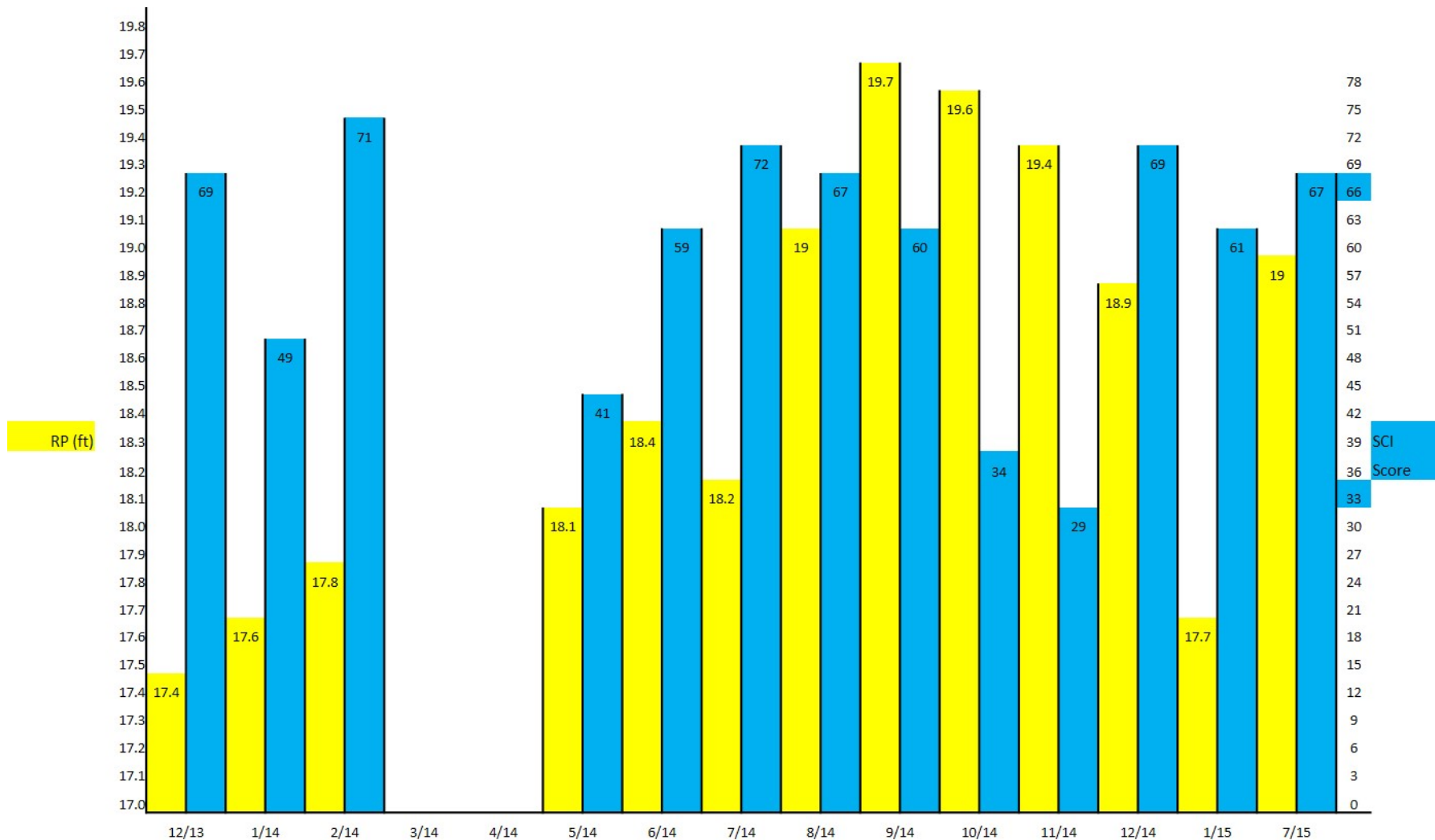
Habitat velocity vs. SCI, $r = 0.2676$





Yellow Creek

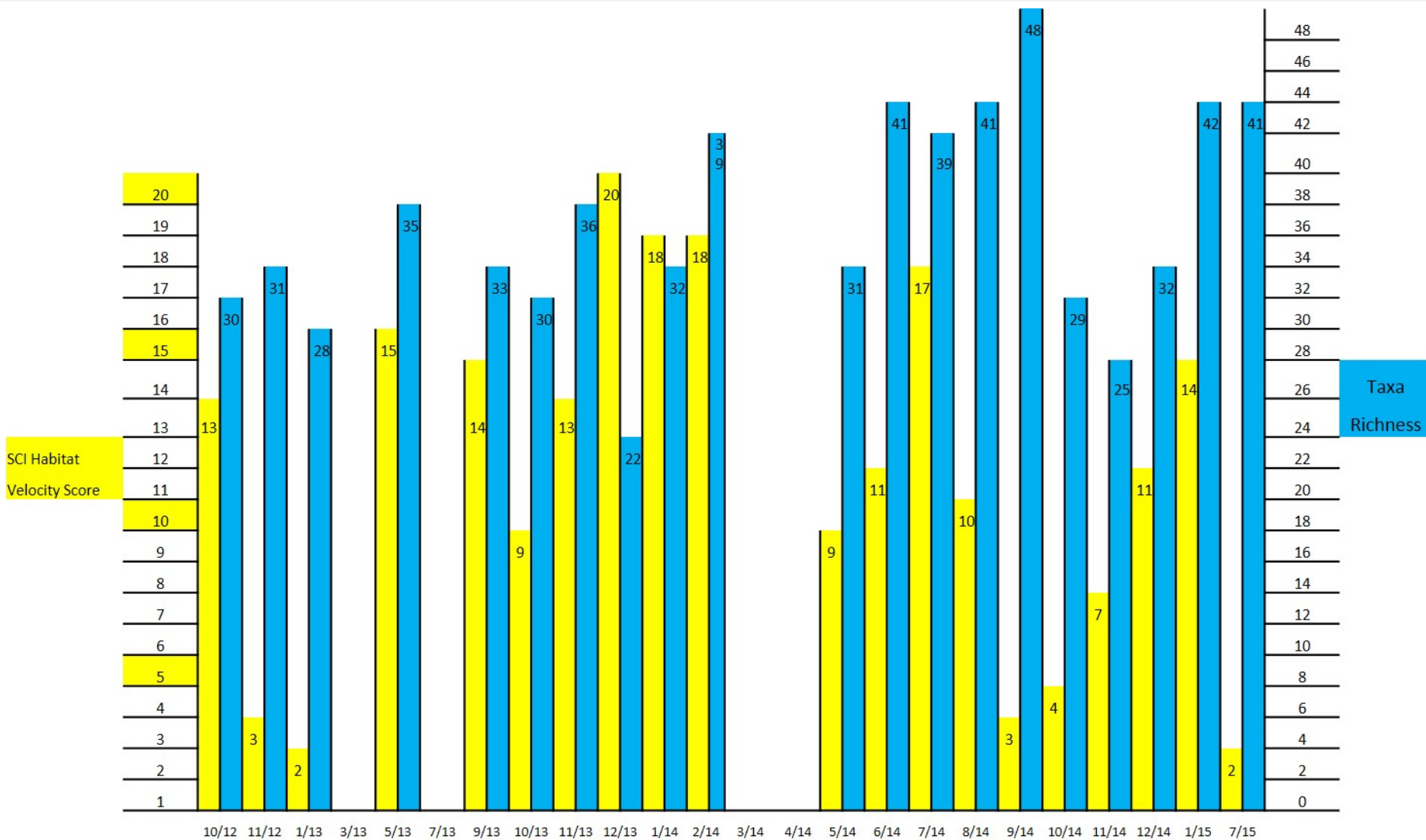
RP (ft.) vs. SCI, $r = -0.3665$





Yellow Creek

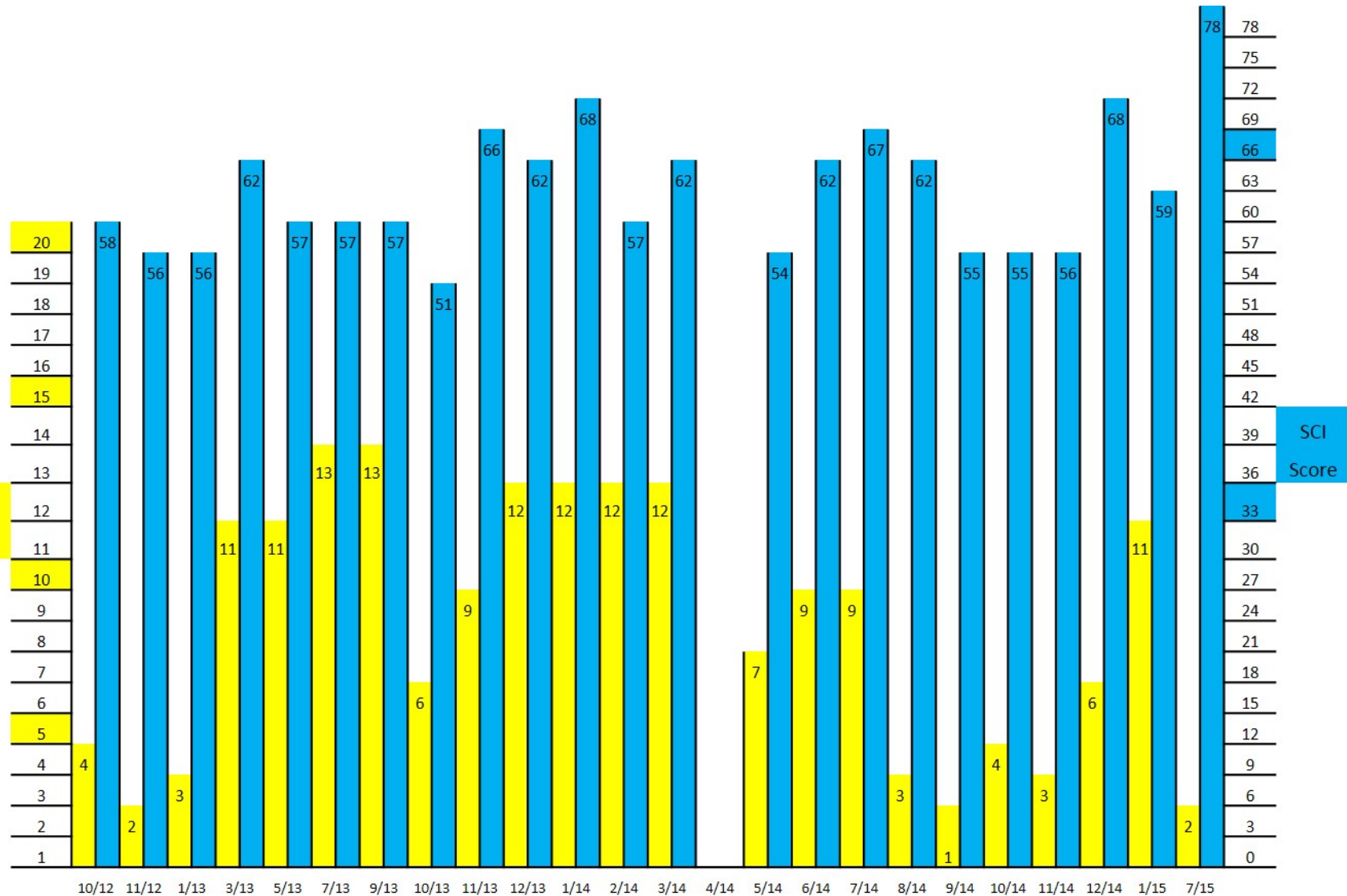
Habitat velocity vs. Taxa richness, $r = -0.754$





Big Branch

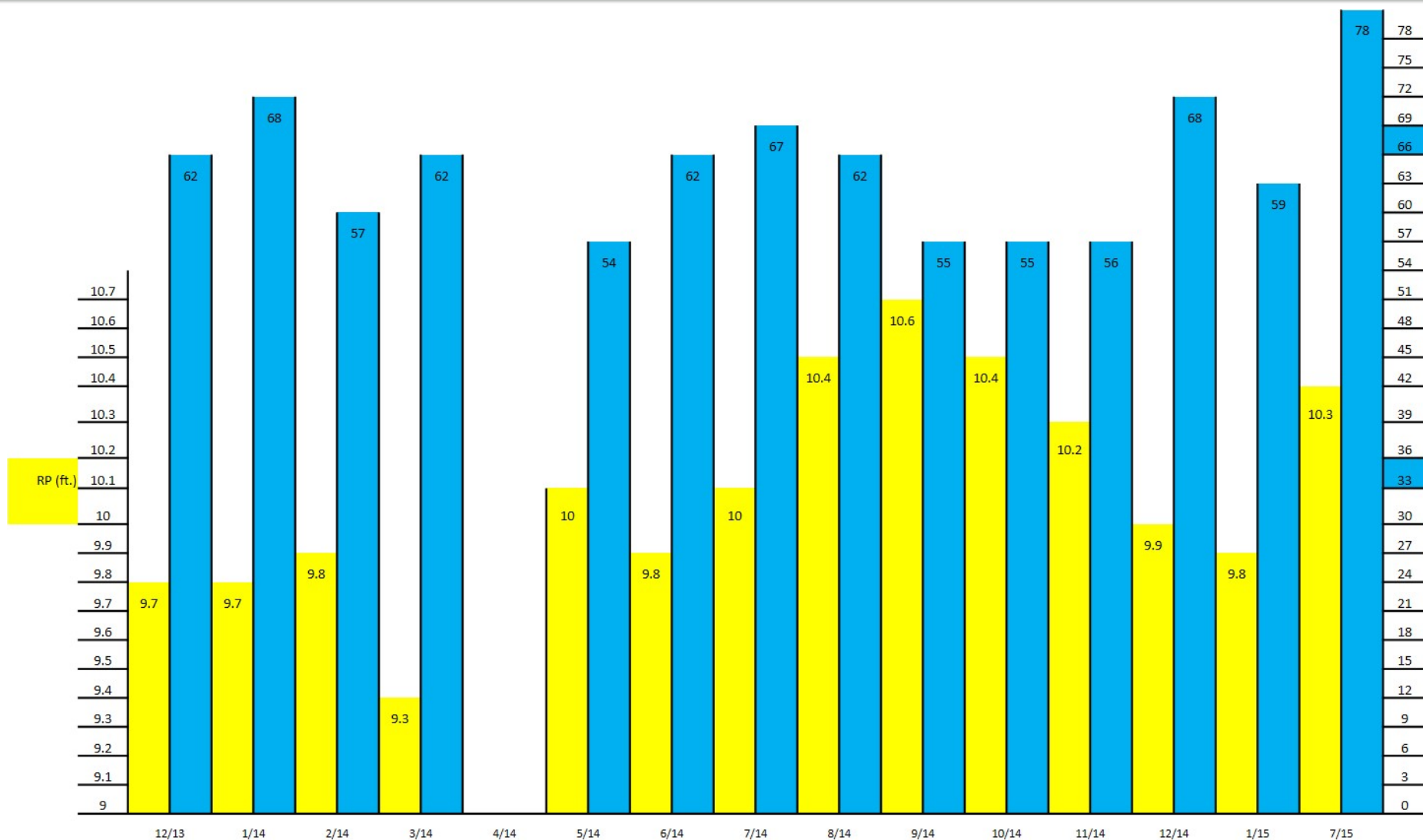
Habitat velocity vs. SCI, $r = 0.0613$





Big Branch

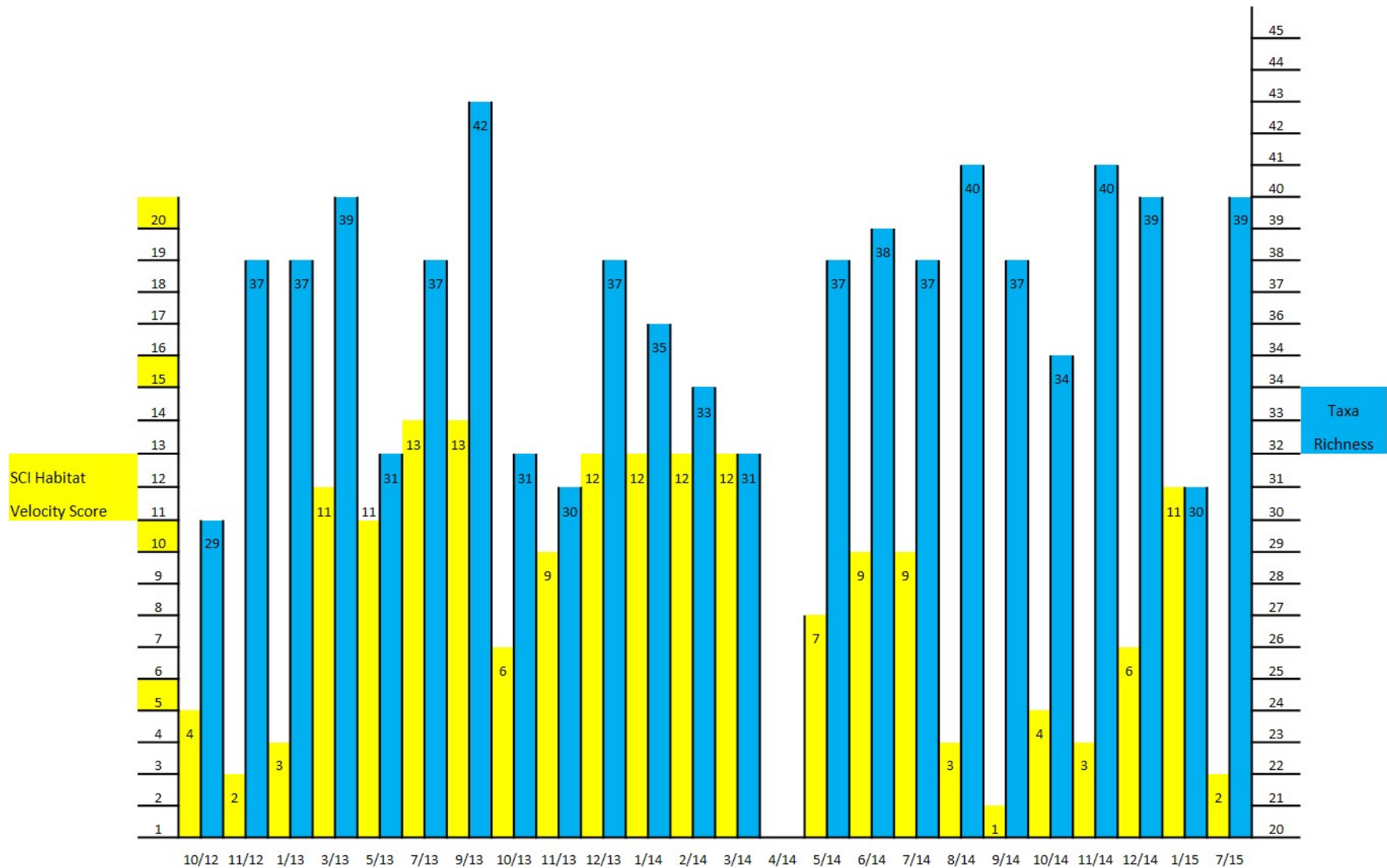
RP (ft.) vs. SCI, $r = 0.5509$





Big Branch

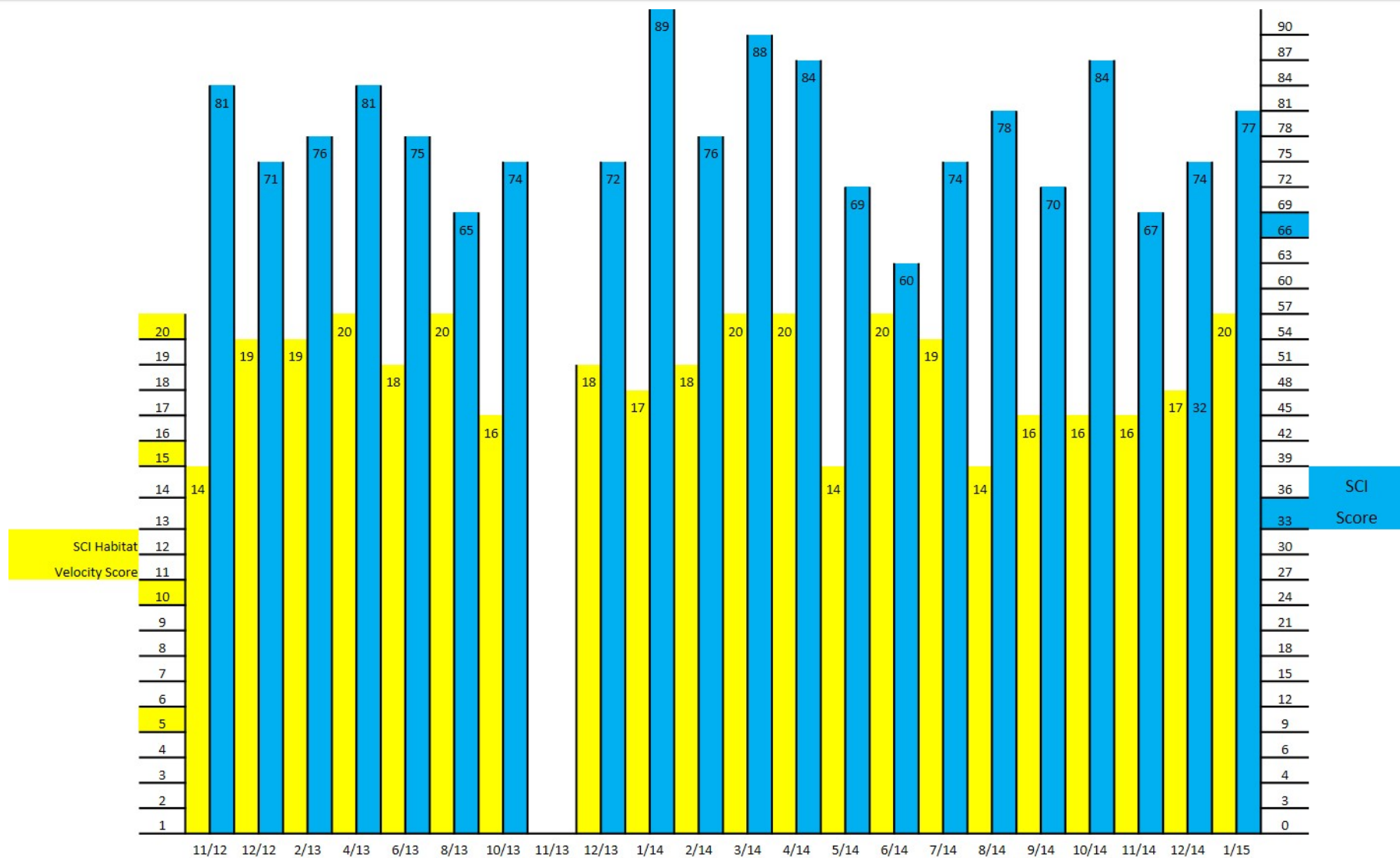
Habitat velocity vs. Taxa richness, $r = -0.1865$





Mule Creek

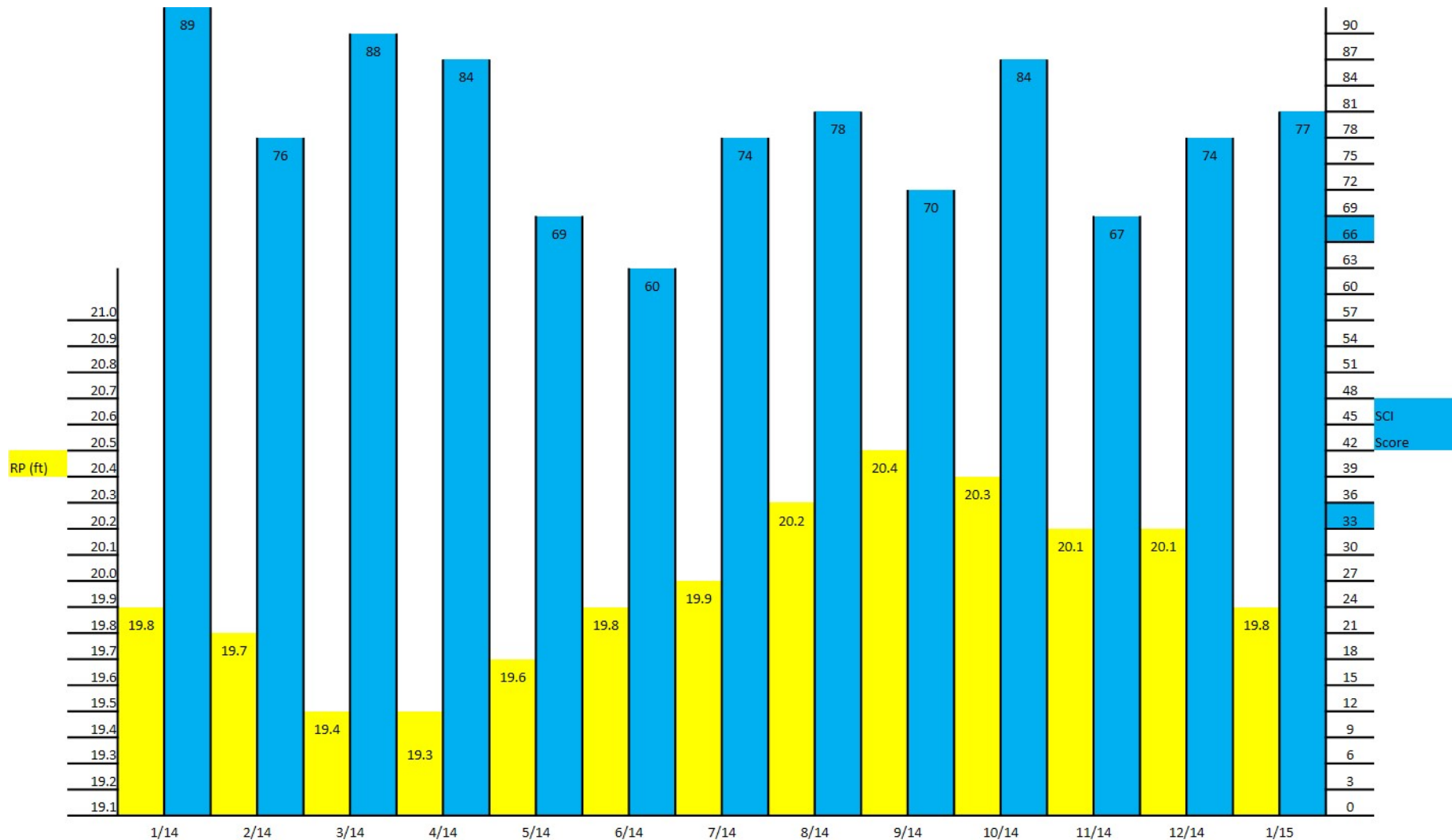
Habitat velocity vs. SCI $r = -0.0203$





Mule Creek

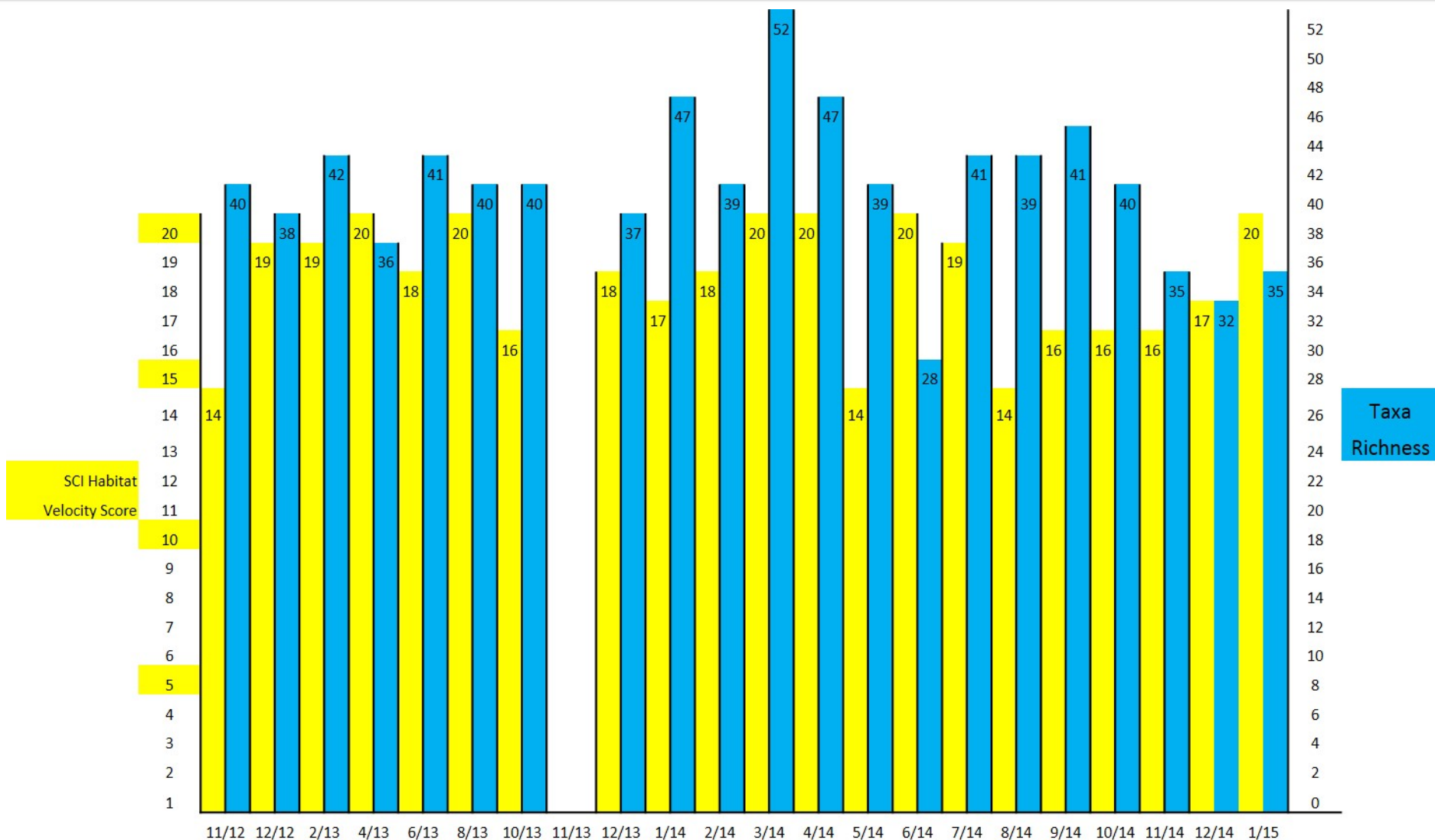
RP (ft.) vs. SCI, $r = -0.2663$





Mule Creek

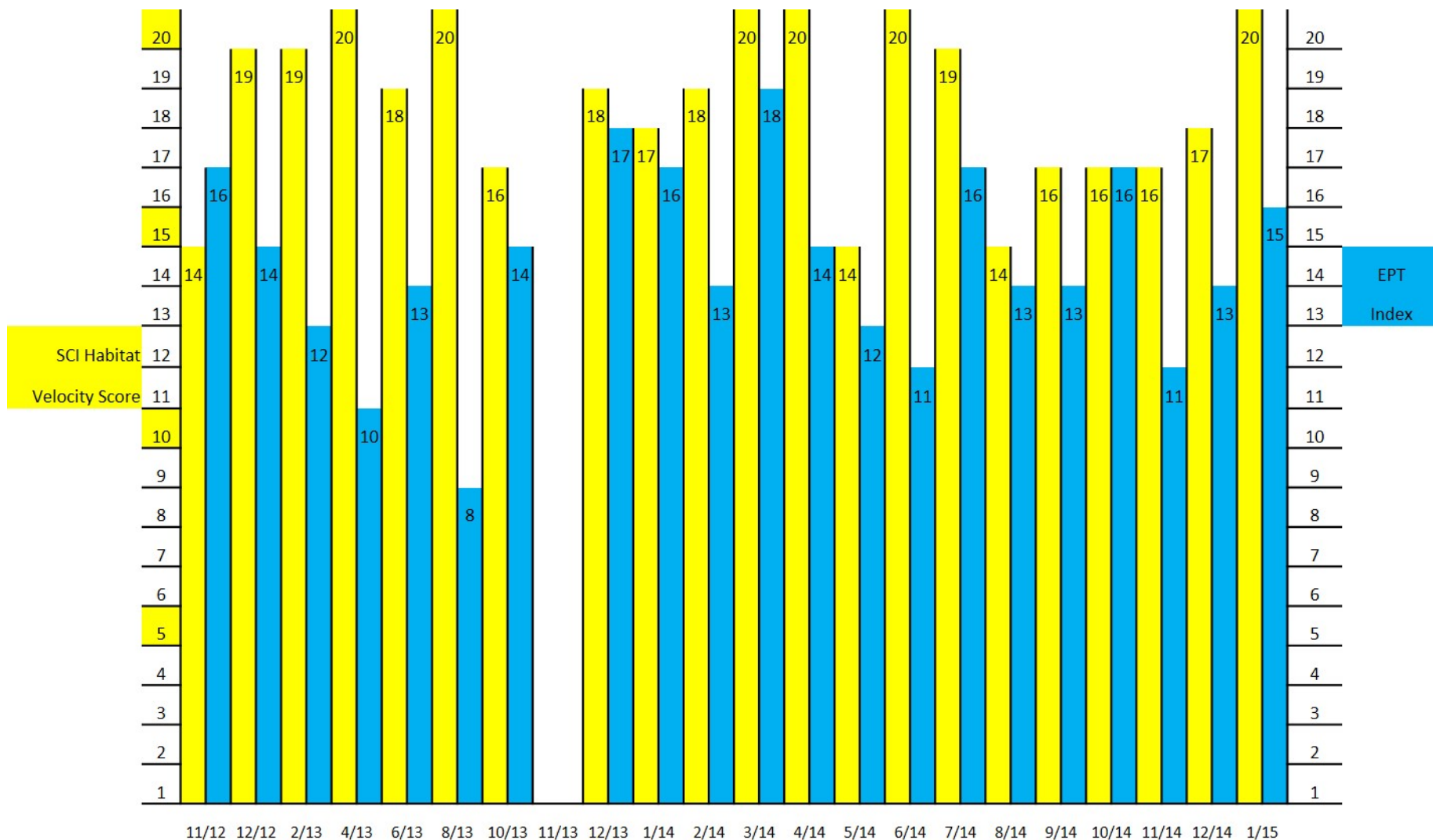
Habitat velocity vs. Taxa richness $r = 0.0470$





Mule Creek

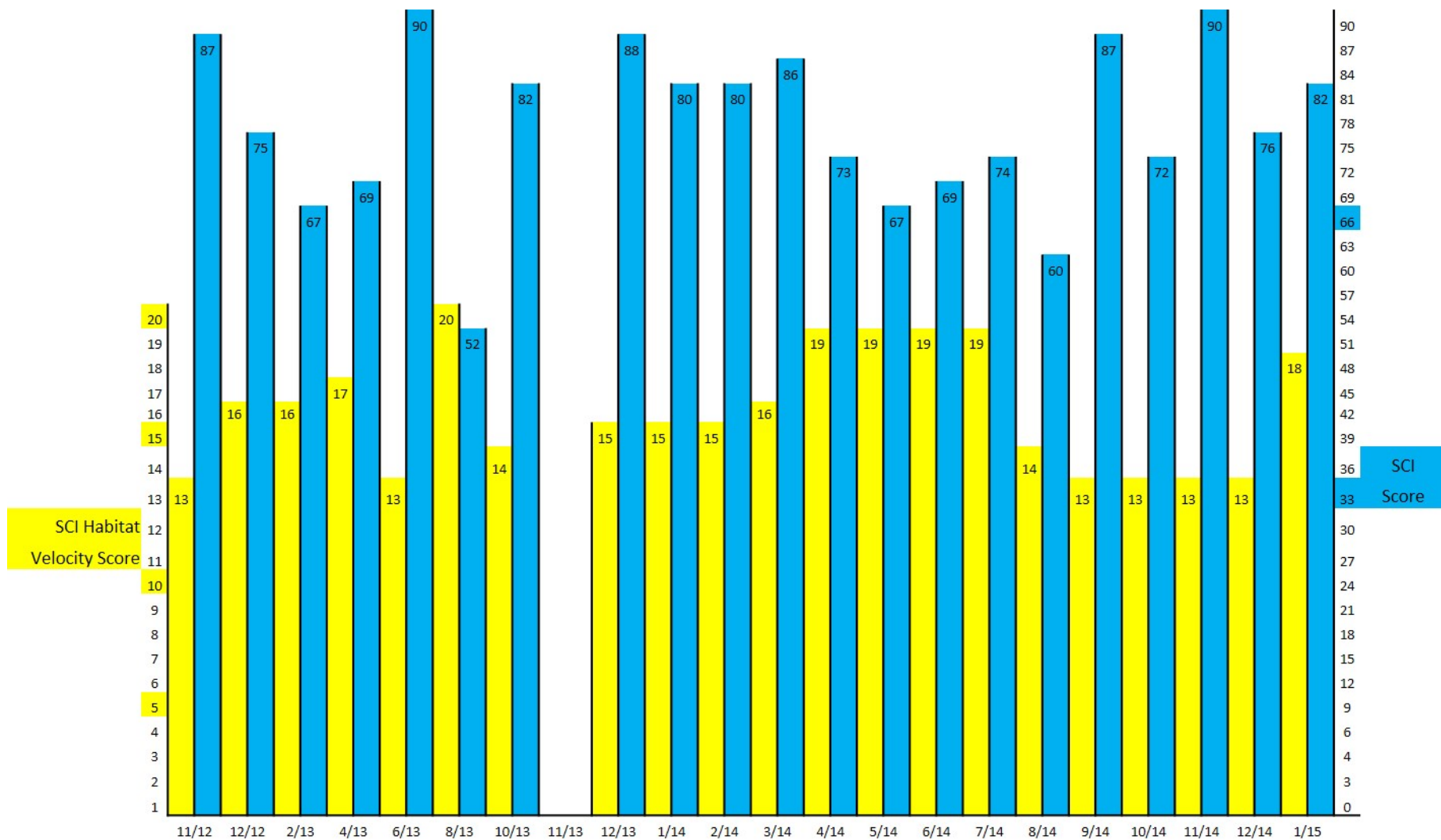
Habitat velocity vs. EPT Index, $r = -0.1145$





Yon Creek

Habitat velocity vs. SCI, $r = -0.5562$





Conclusions

The results of this study indicate that, at least for these panhandle streams, flow and water level in the stream prior to sampling has little effect on the macroinvertebrate populations. We found no differences in the metrics used in the calculation of the SCI and on many occasions the SCI was highest following a major event such as a flood or low flow.

We did not sample during a no flow event, where the stream is reduced to isolated pools, so we can not address those effects on the macroinvertebrate community or on the SCI at this time. Possibly if conditions are right, we may be able to sample during no flow conditions this summer.

If the water level is not too high to preclude safe collecting, or if there is water in the stream, SCI sampling can be undertaken.



Any Questions?

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