

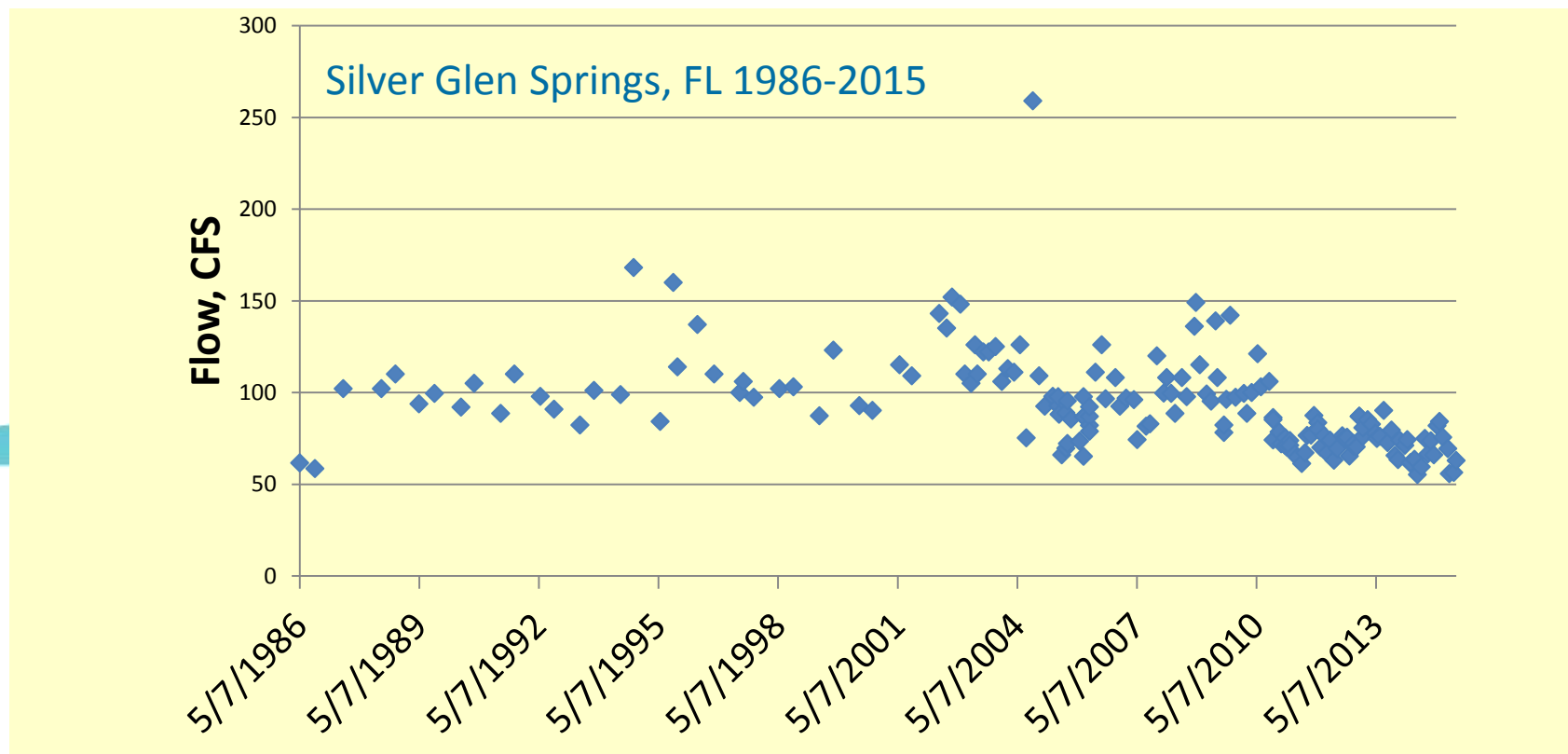
EXPLORING PAST VELOCITY CONDITIONS IN SOUTHEASTERN STREAMS USING USGS FLOW RECORDS

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Gainesville, FL



This line of inquiry started with studies at Florida's freshwater springs and the waters that are affected by them.

Analysis of historical flow data at many Florida springs shows a long-term trend of lower flow.





Smothering algae within spring pools and springs runs lead to impairment.

Algal abundance in springs is generally attributed to increased nutrient concentrations.

*Smothering algae at Silver Springs,
Marion County FL*

However, at some springs with algae problems, increased nutrients are not found.

Could changes in stream velocity conditions be contributing to algal abundance?



Springs are well known for their consistent physical characteristics: flow, temperature, TDS/salinity

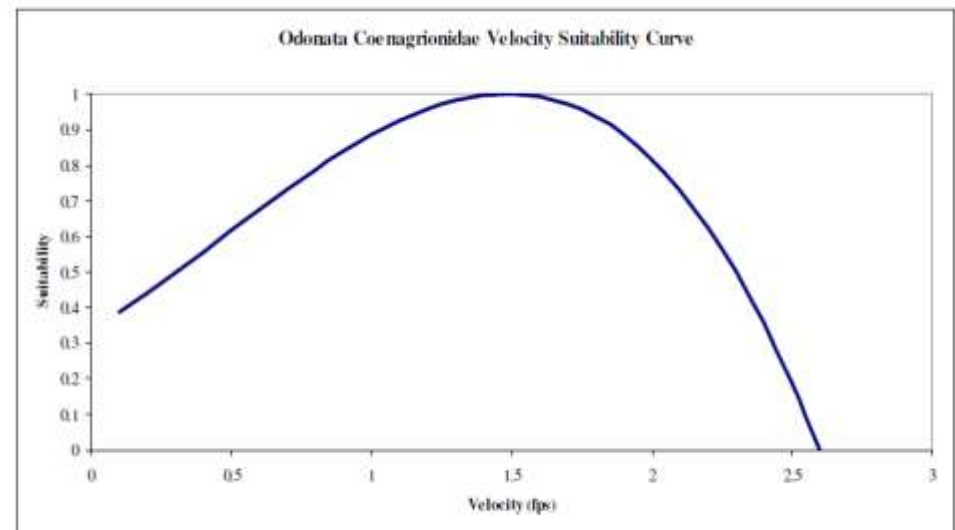
Studies at Gum Slough Springs (Citrus County, FL) showed that stream velocity conditions affect algal accumulation (*King, 2014 in Hydrobiologia*)

Thresholds

- > 1.15 ft/sec minimal accumulation
- < 0.73 ft/sec often 100% coverage



Habitat suitability for many aquatic organisms in streams is affected by stream velocity



Source: Hagan, 2008

Questions

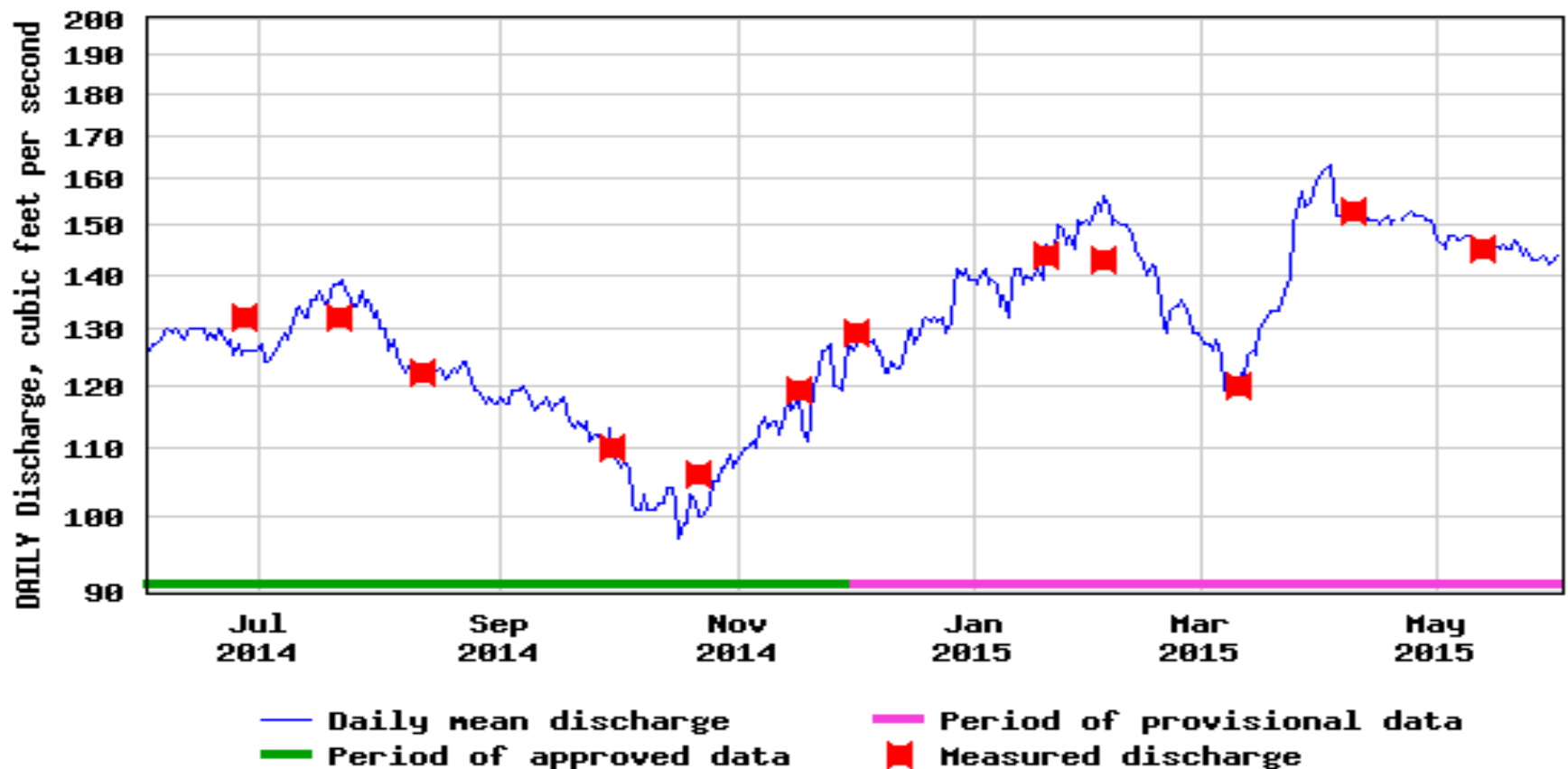
1. Where can we find long term datasets for velocity?
2. Do we see temporal changes in velocity within spring runs that may affect patterns of algal accumulation and/or distribution of aquatic organisms?

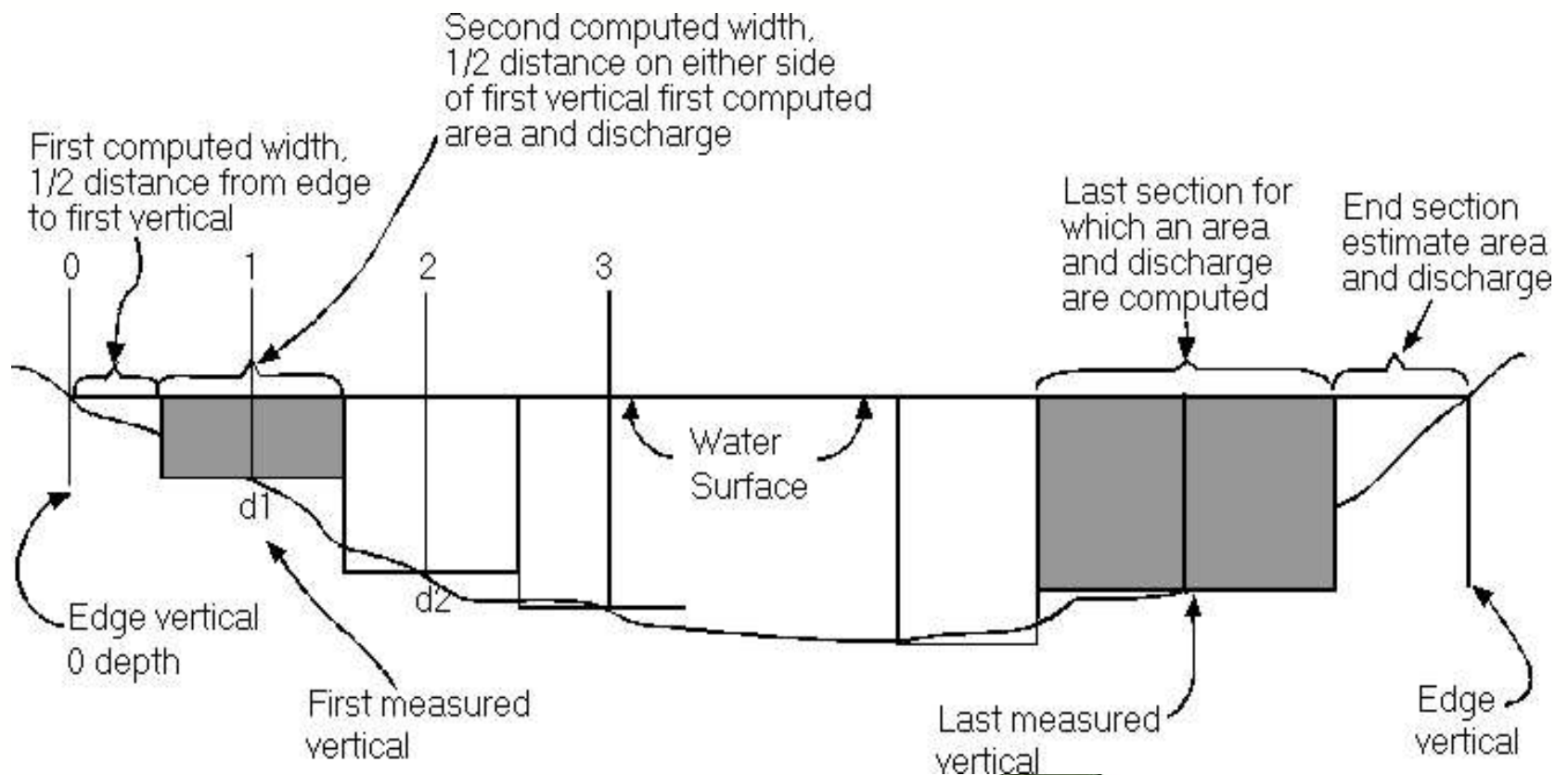


Manual measurements form the basis for daily mean flow estimates

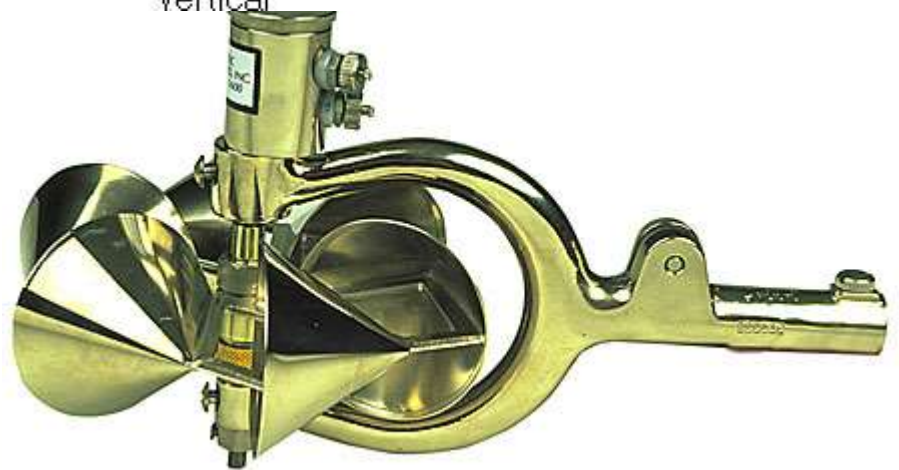


USGS 02235500 BLUE SPRINGS NEAR ORANGE CITY, FL





Each manual flow measurement consists of two components: Cross-sectional area and velocity





USGS flow records include cross-sectional average velocity, which is archived with every manual flow measurement made.

This means we can sometimes find relatively long-term records of velocity that may give clues to how velocity conditions have changed over time.

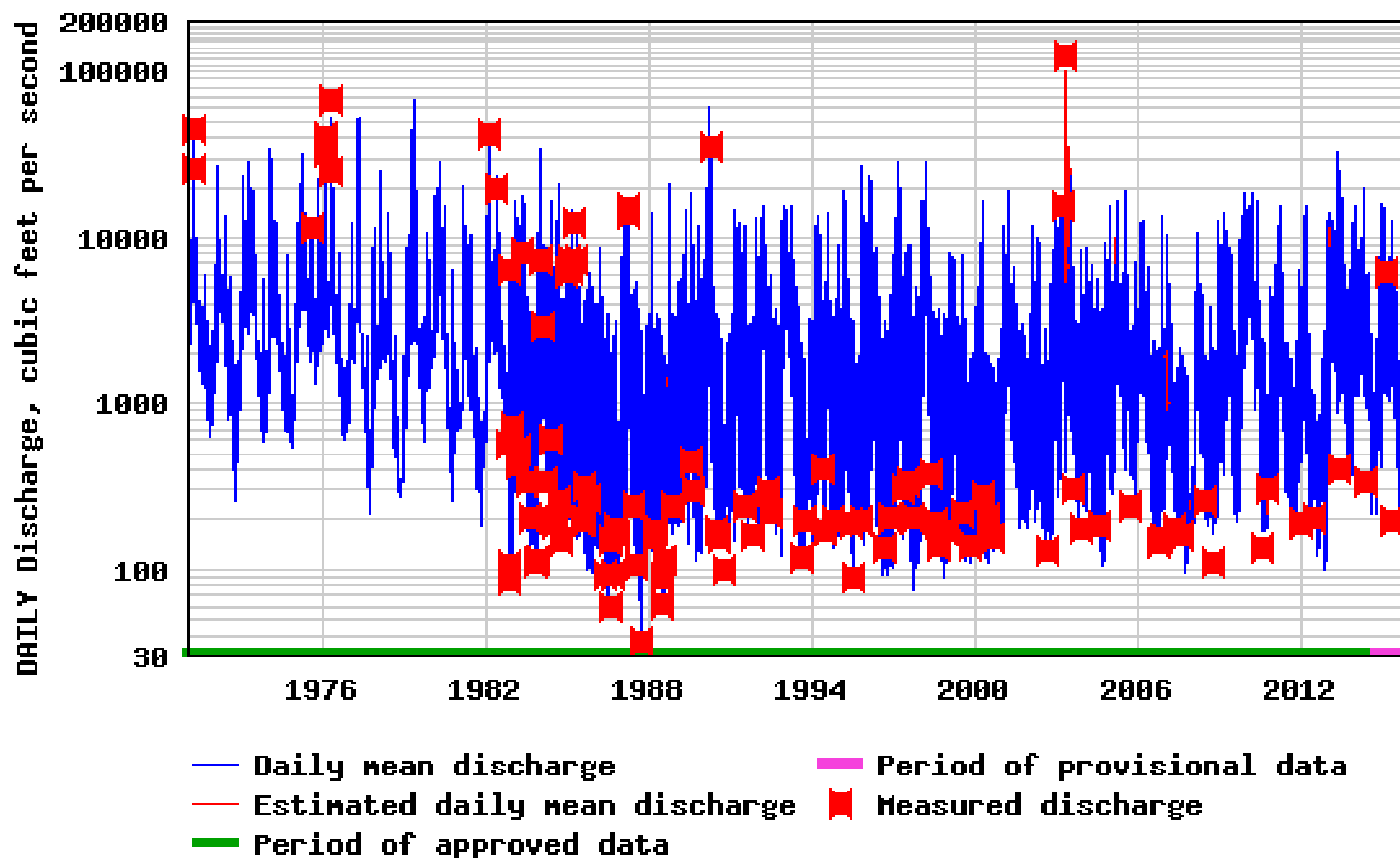


Monday, September 07, 2015 14:30ET



<http://waterwatch.usgs.gov>

USGS 02414500 TALLAPOOSA RIVER AT WADLEY AL



USGS 02414500 TALLAPOOSA RIVER AT WADLEY AL

Available data for this site

SUMMARY OF ALL AVAILABLE DATA



GO

Stream Site

DESCRIPTION:

Latitude 33°07'00", Longitude 85°33'39" NAD27
Randolph County, Alabama, Hydrologic Unit 03150109
Drainage area: 1,675.00 square miles
Contributing drainage area: 1,675.00 square miles,
Datum of gage: 599.87 feet above NGVD29.

AVAILABLE DATA:

Data Type	Begin Date	End Date	Count
Current / Historical Observations (availability statement)	2007-10-01	2015-09-07	
Daily Data			
Discharge, cubic feet per second	1923-10-01	2015-09-06	33564
Gage height, feet	1971-10-01	2015-09-06	15882

Click to hide News Bulletins

- July 9, 2015 - The [NWIS Mapper](#) is back online
- Try our new [Mobile-friendly water data site](#) from your mobile device!
- [Full News](#)

SUMMARY OF ALL AVAILABLE DATA

- Location map
- Time-series: Current/Historical Observations
- Time-series: Daily data
- Time-series: Daily statistics
- Time-series: Monthly statistics
- Time-series: Annual statistics
- Surface-water: Peak streamflow
- Surface-water: Field measurements
- Water-Quality: Field/Lab samples
- USGS Instantaneous-data archive: (Offsite)
- Water-Year Summary
- EPA Surf your watershed: Offsite

USGS 02414500 TALLAPOOSA RIVER AT V

Available data for this site

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Daily Data			

http://waterdata.usgs.gov/al/nwis/measurements/?site_no=02414500&agency_cd=USGS

USGS WaterWatch -- Streamfl... USGS Surface Water for Ala... X

File Edit View Favorites Tools Help

USGS 02414500 TALLAPOOSA RIVER AT WADLEY AL

Available data for this site Surface-water: Field measurements GO

Randolph County, Alabama
 Hydrologic Unit Code 03150109
 Latitude 33°07'00", Longitude 85°33'39" NAD27
 Drainage area 1,675.00 square miles
 Contributing drainage area 1,675.00 square miles
 Gage datum 599.87 feet above NGVD29

Output formats

- [HTML table with channel data](#)
- [HTML table without channel data](#)
- [Tab-separated data with channel data](#)
- [Tab-separated data without channel data](#)
- [Graph of data](#)
- [Reselect output format](#)

Meas. Number	Date	Time	Time Datum	Measurement Used?	Who	Measuring Agency	Stream flow (ft ³ /s)	Gage Height (ft)	Rating No.	Shift Adj. (ft)	% Diff.	GH Change (ft)	Meas. Duration (hr)
603	2015-05-20	12:17:30	CDT	Yes	RSM AKV	USGS	199	2.60	24.0	-0.08	-1.0		
602	2015-02-11	11:22:30	CST	Yes	RSM/WSM	USGS	6170	7.16	24.0	-0.14	-7.8		
601	2014-05-23	10:19	CDT	Yes	DHW/WSM	USGS	341	2.97	24.0	-0.10	-0.6		
600	2013-06-12	10:02:30	CDT	Yes	DHW/WSM	USGS	403	3.18	24.0	-0.19	-0.2	0.12	
599	2012-06-07	10:12:30	CDT	Yes	DHW/EAP	USGS	206	2.65	24.0	-0.11	-1.0	0.19	
598	2012-01-06	09:35	CST	Yes	DHW/WSM	USGS	189	2.58	24.0	-0.10	0.5	-0.04	
597	2010-10-19	13:47:30	CDT	Yes	wsm	USGS	304	2.56	24.0	0.22	1.0	0.22	

3:08 PM 9/7/2015

Velocity is included with **channel data** (more columns)

Book1 - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View

Normal Page Layout Page Break Preview Custom Views Full Screen

Ruler Formula Bar Gridlines Headings Zoom 100% Zoom to Selection New Window Arrange All Freeze Panes Hide View Side by Side Synchronous Scrolling Reset Window Position Save Workspace Switch Windows Macros

AA13

	C	D	I	J	W	X	Y	Z	AA	AB	
13											
14											
15	measurement_nu	measurement_dt	gage_height_va	discharge_va	velocity_method	chan_discharge	chan_width	chan_area	chan_velocity	chan_stability	chan_
16	6s	19d	12s	12s	5s	14s	14s	14s	14s	4s	4s
87	396	3/3/1971 14:05	21.91	45300		45300	748	8520	5.32	UNSP	UNSP
88	397	3/4/1971 11:00	16.02	25600		25600	335	4380	5.84	UNSP	UNSP
89	438	8/12/1975	9.22	11500		11500				UNSP	UNSP
90	444	1/27/1976	19.06	32400		32400				UNSP	UNSP
91	443	1/27/1976 7:40	21.18	40500		40500	739	7670	5.29	UNSP	UNSP
92	446	3/16/1976 15:15	26.37	66100		66100	790	12000	5.51	UNSP	UNSP
93	447	3/19/1976	15.42	24800		24800				UNSP	UNSP
94	500	2/4/1982 10:15	20.99	41700		41700	745	7450	5.6	UNSP	UNSP
95	502	4/27/1982 10:05	13.02	20000		20000	302	3460	5.78	UNSP	UNSP
96	505	9/8/1982	3.19	562		562	295	570	0.986	UNSP	UNSP
97	506	10/14/1982	6.97	6460		6460	290	1750	3.69	UNSP	UNSP
98	507	10/28/1982	2.35	106		106	288	372	0.28	UNSP	UNSP
99	508	10/29/1982	2.28	86.6		86.6	291	391	0.22	UNSP	UNSP
100	509	11/29/1982	3.45	719		719	289	601	1.2	UNSP	UNSP
101	510	1/26/1983	3.02	424		424	292	498	0.85	UNSP	UNSP

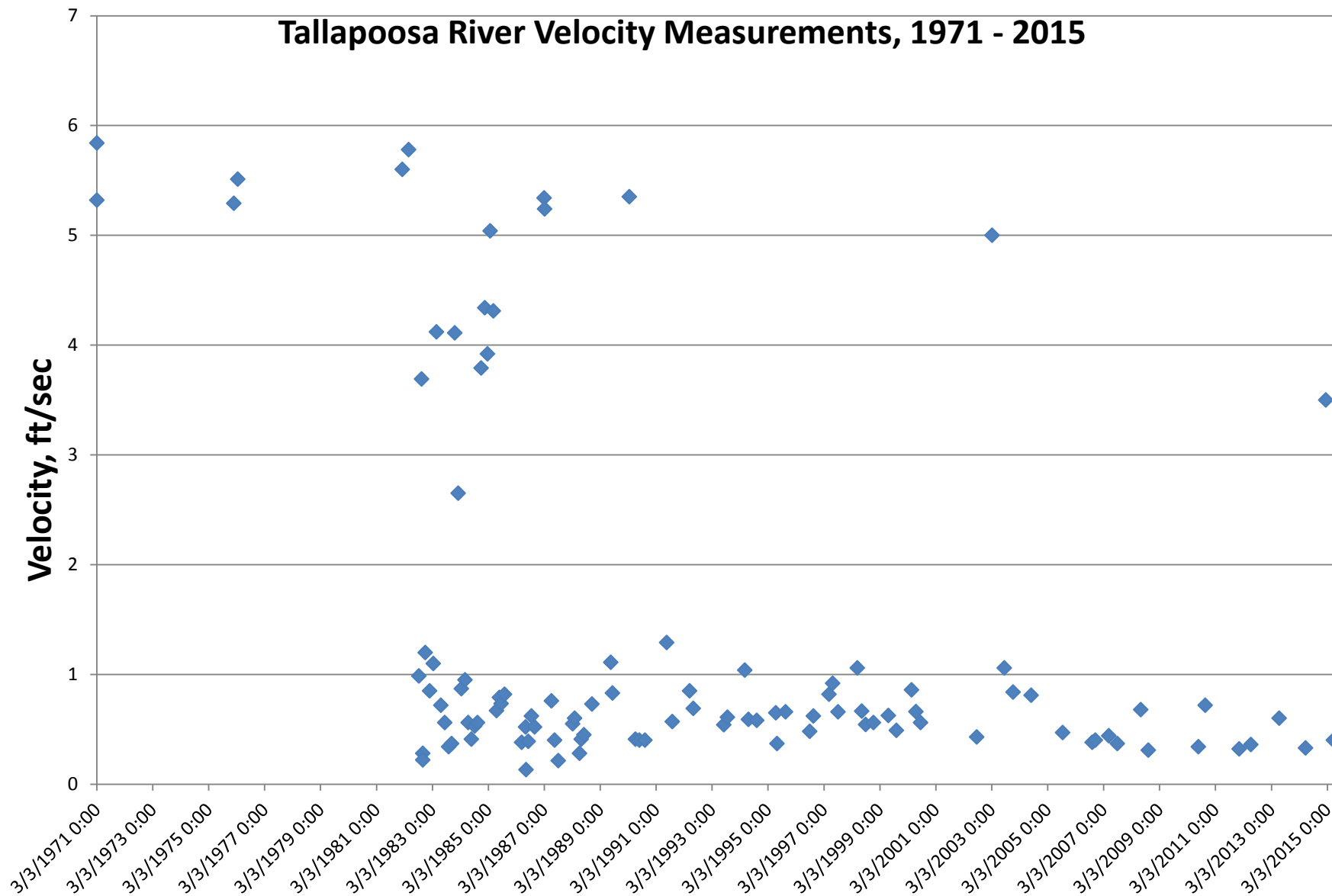
Sheet1 Sheet2 Sheet3

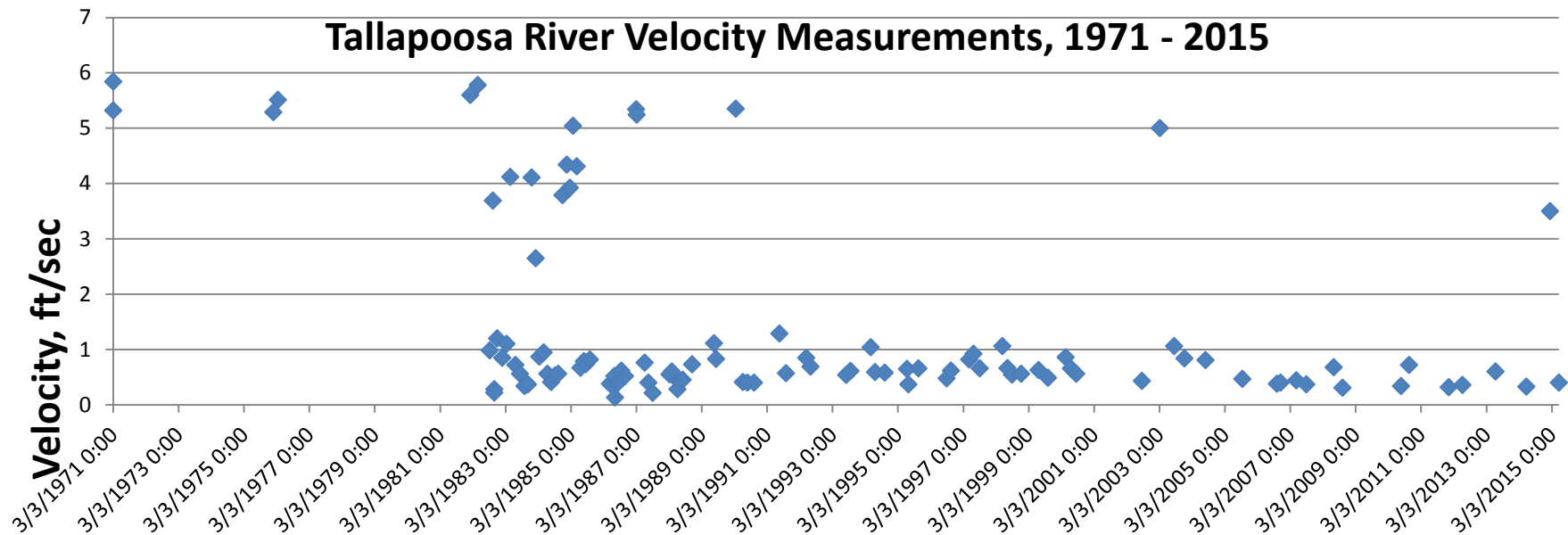
Ready Average: 1.41167619 Count: 107 Sum: 148.226 100%

3:13 PM 9/7/2015

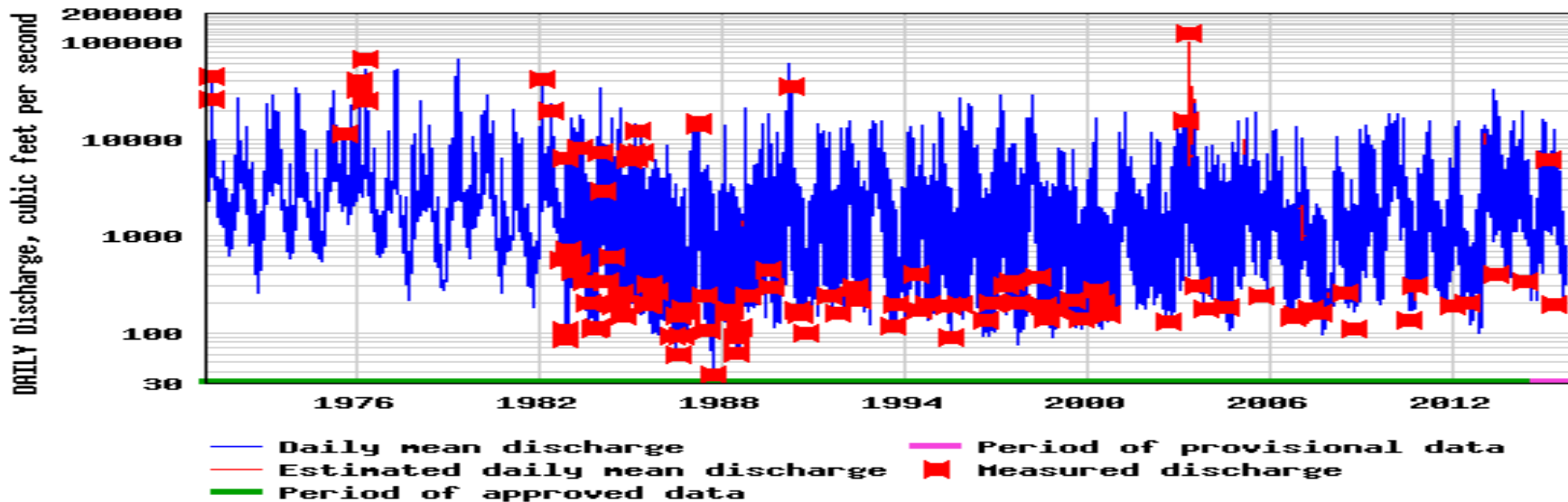
Exported to Excel - The archived value is channel velocity ($Q / X\text{-sec area}$)

Tallapoosa River Velocity Measurements, 1971 - 2015





USGS 02414500 TALLAPOOSA RIVER AT WADLEY AL



Time series analysis of velocity using
SEFA (System for Environmental Flow)
on USGS record
at Blackwater Creek, AL

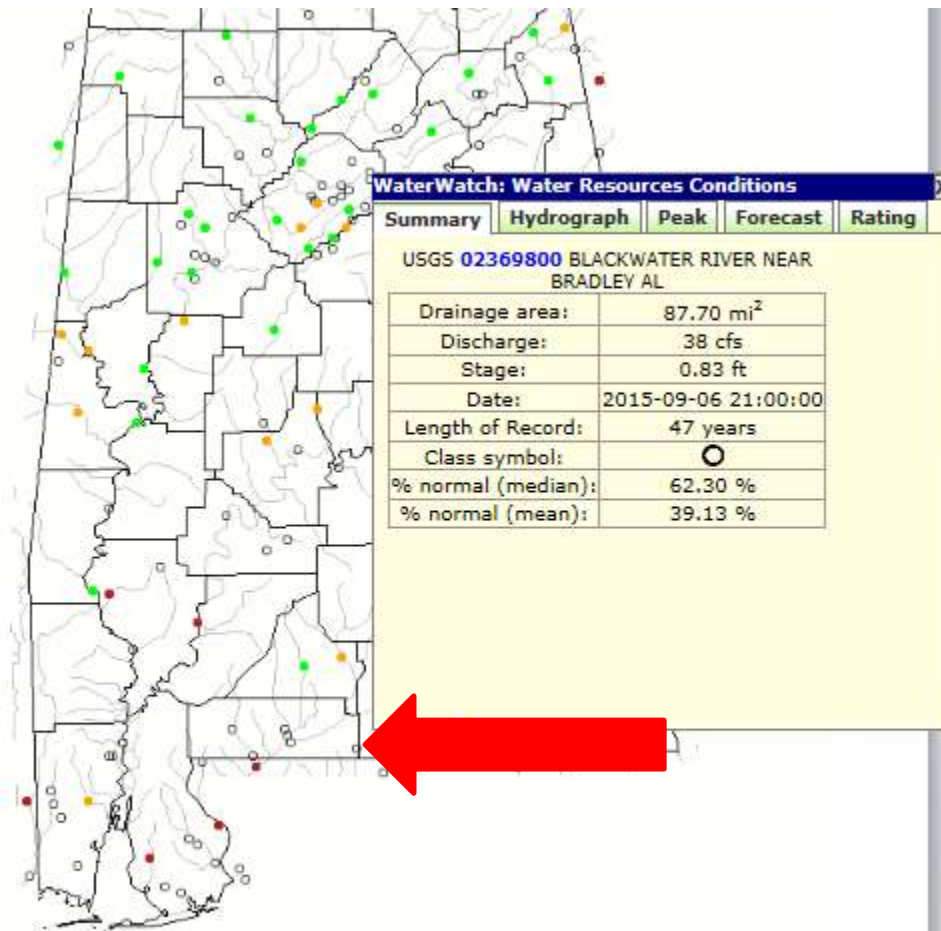
<http://sefa.co.nz>

SEFA: SYSTEM FOR ENVIRONMENTAL FLOW ANALYSIS



NORMANDEAU
environmental consultants

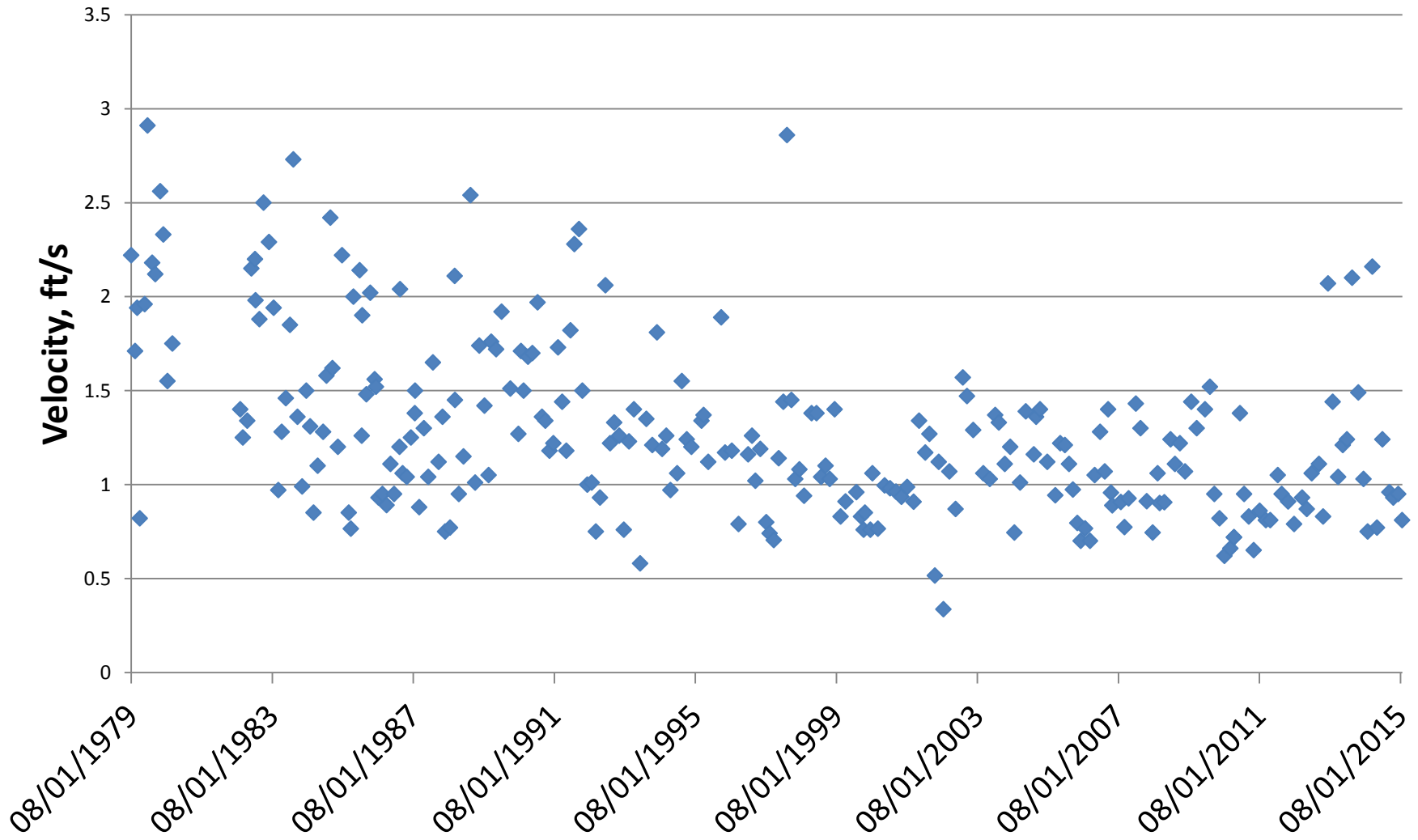


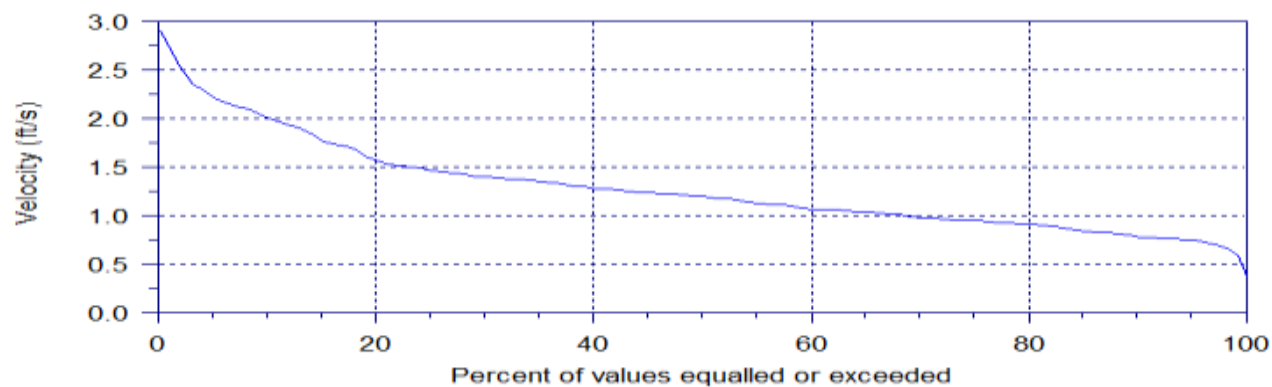


WaterWatch: Water Resources Conditions	
Summary	Hydrograph
Peak	Forecast
Rating	
USGS 02369800 BLACKWATER RIVER NEAR BRADLEY AL	
Drainage area:	87.70 mi ²
Discharge:	38 cfs
Stage:	0.83 ft
Date:	2015-09-06 21:00:00
Length of Record:	47 years
Class symbol:	○
% normal (median):	62.30 %
% normal (mean):	39.13 %

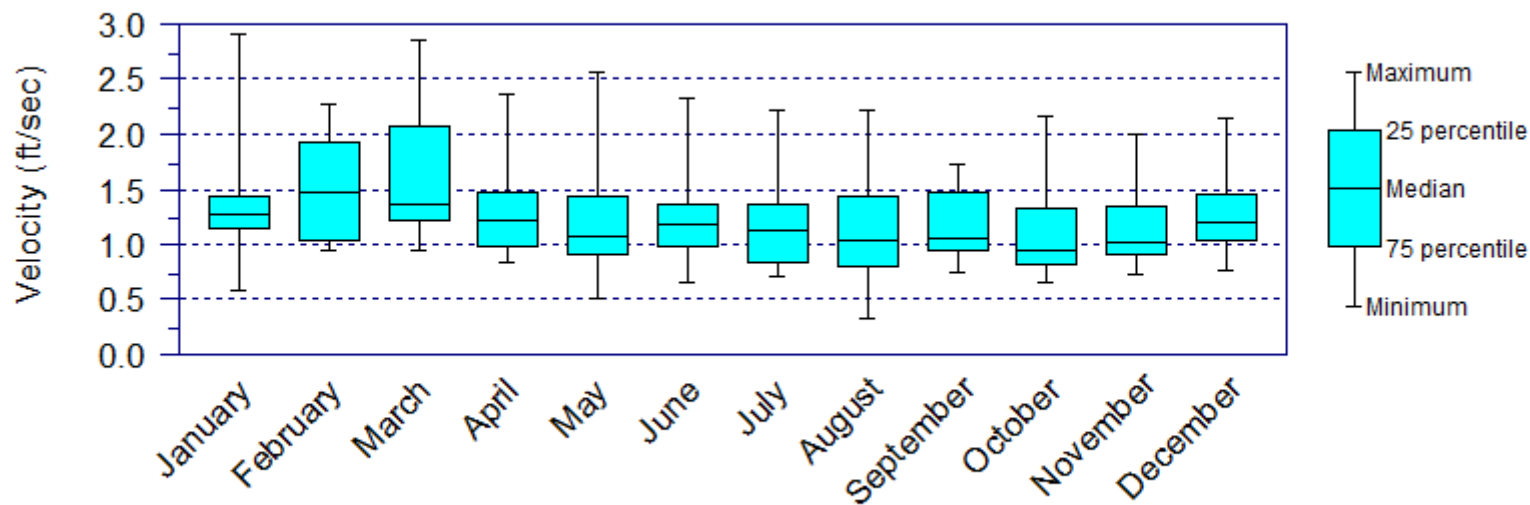
Blackwater Creek, AL

Measured cross-section average velocity 1979 - 2015

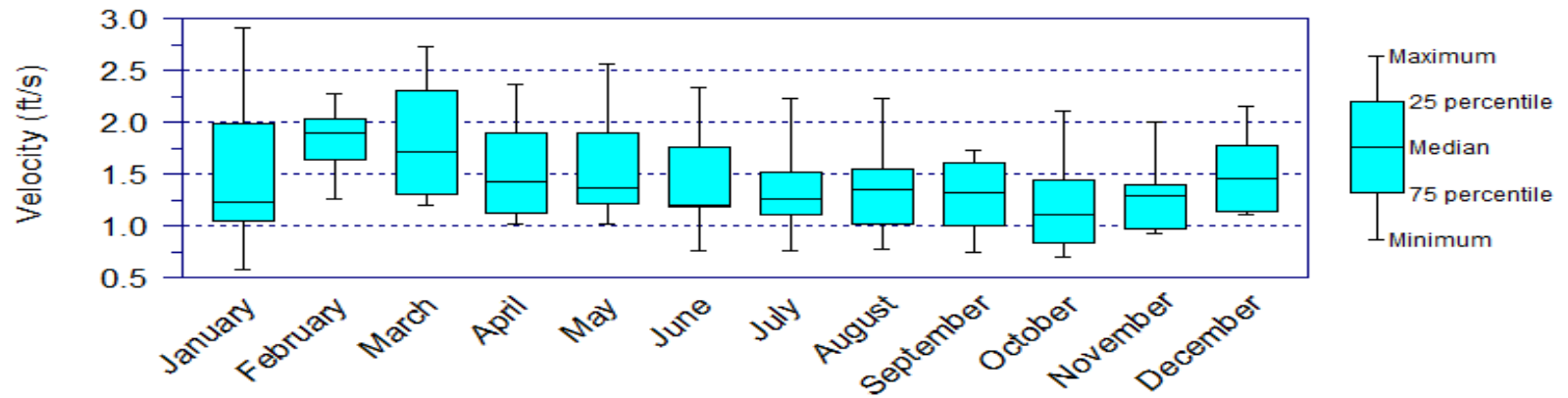




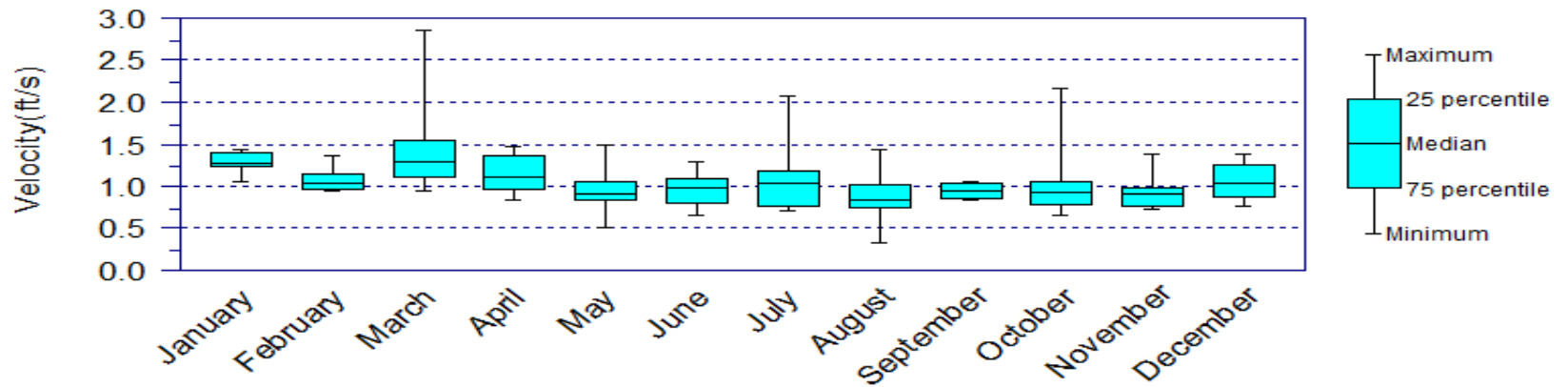
Blackwater Creek, AL 1979-2015



Blackwater Ck pre-1998



Blackwater Ck V 1998 - 2015



Concluding thoughts

Warning: Long-term data sets require detailed “forensics”

Cross-sectional velocity is probably a somewhat crude measure of instream conditions, but appropriate for looking at macro-level changes over time

Need to support continued acquisition of flow data at long-term sites

