Ecosystem Monitoring Program 2017 – water quality conditions

Joe Needoba

OHSU-PSU School of Public Health

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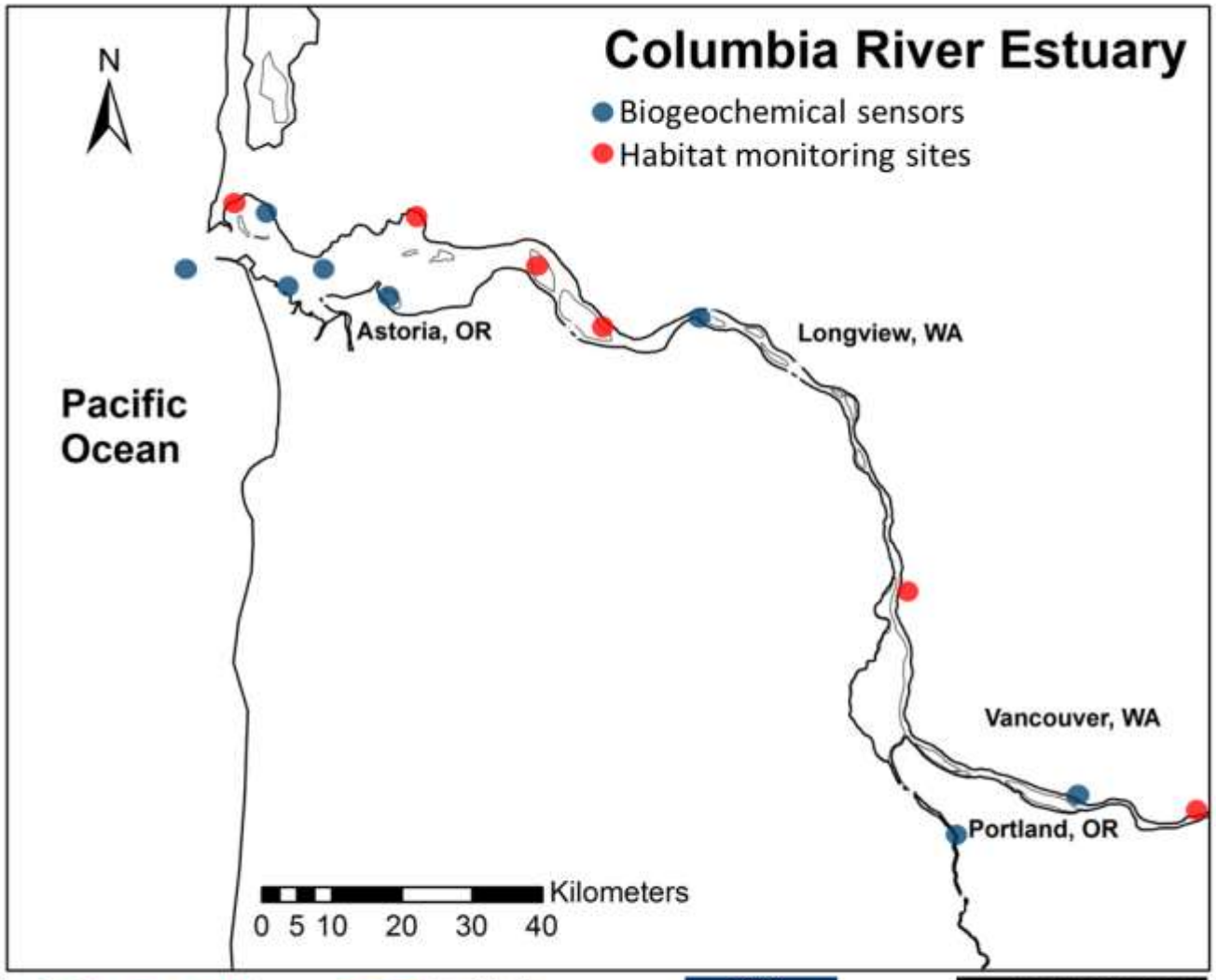
Sensor Networks in the Columbia River estuary

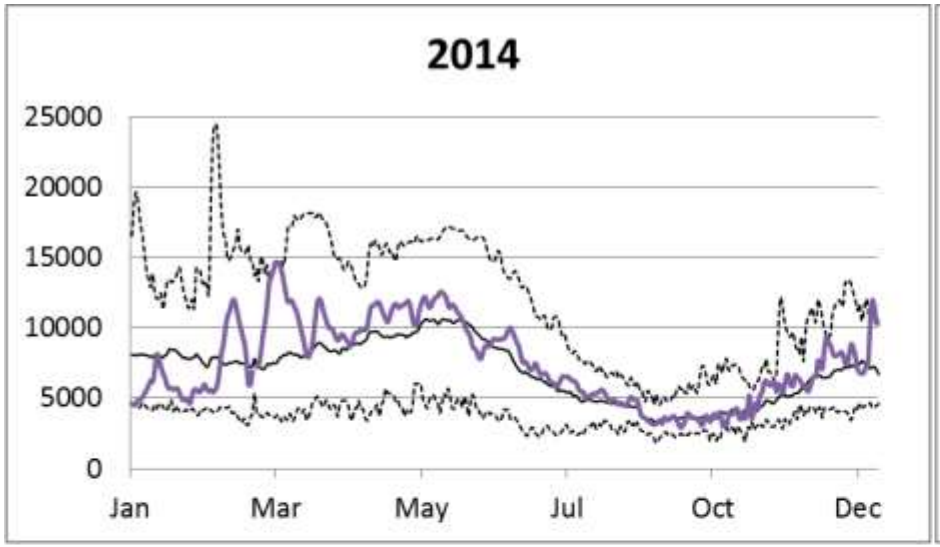


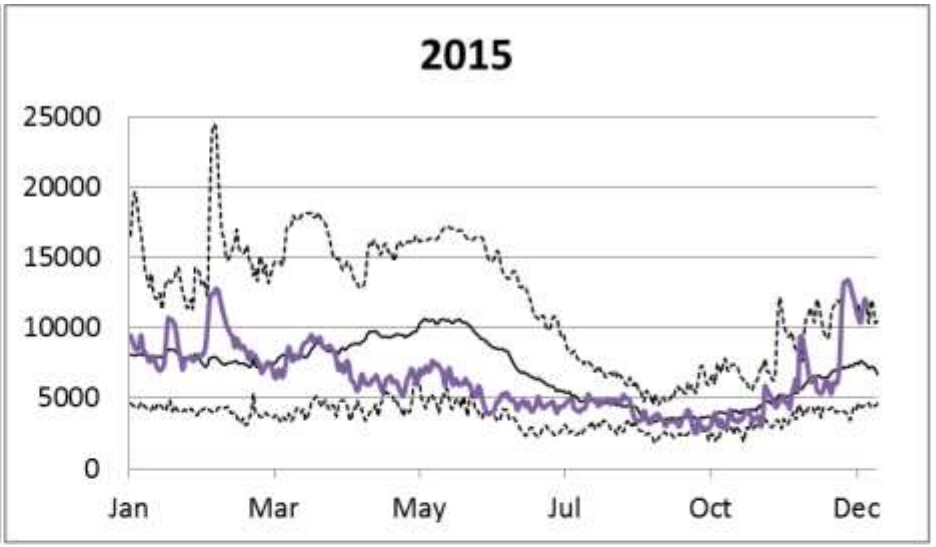
CMOP Center for Coastal Margin Observation & Prediction

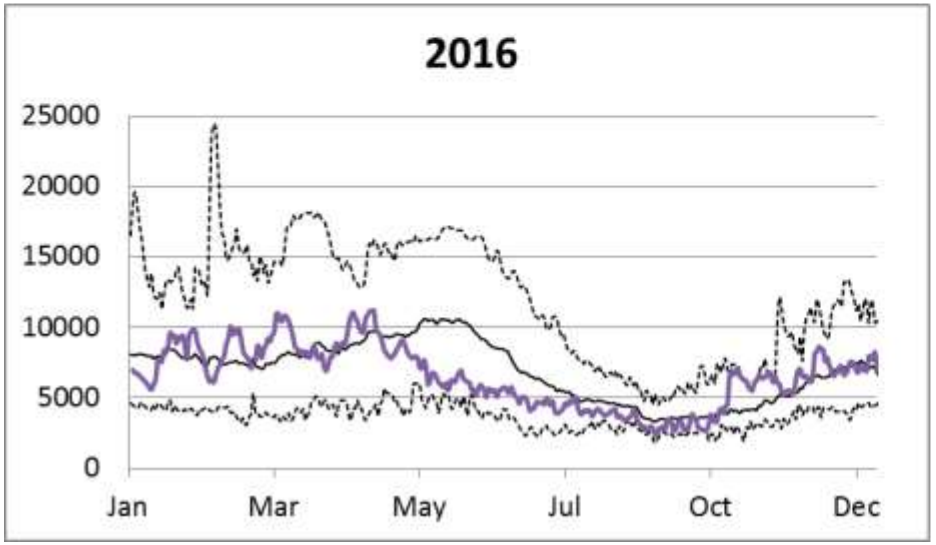
Lower Columbia Estuary Partnership Celebrating 20 Years

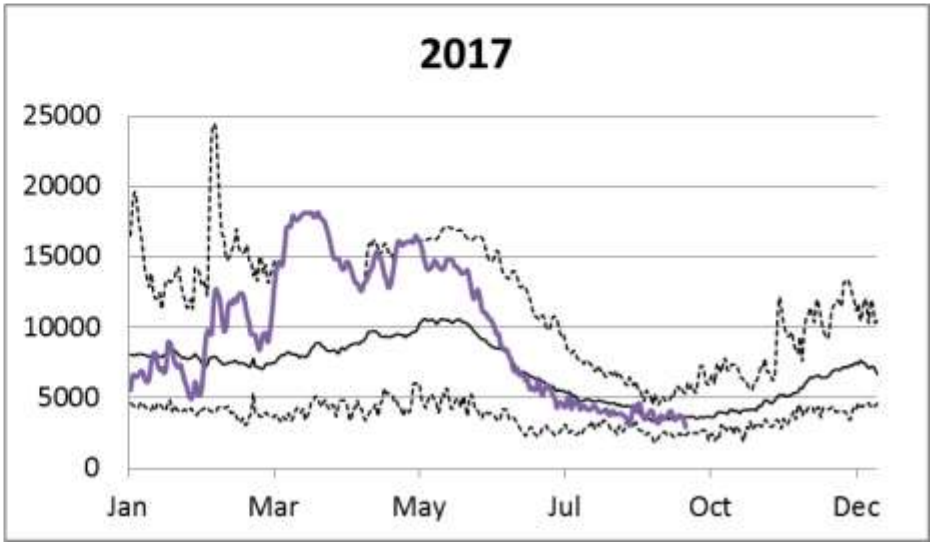
USGS science for a changing world

River Discharge at BAT

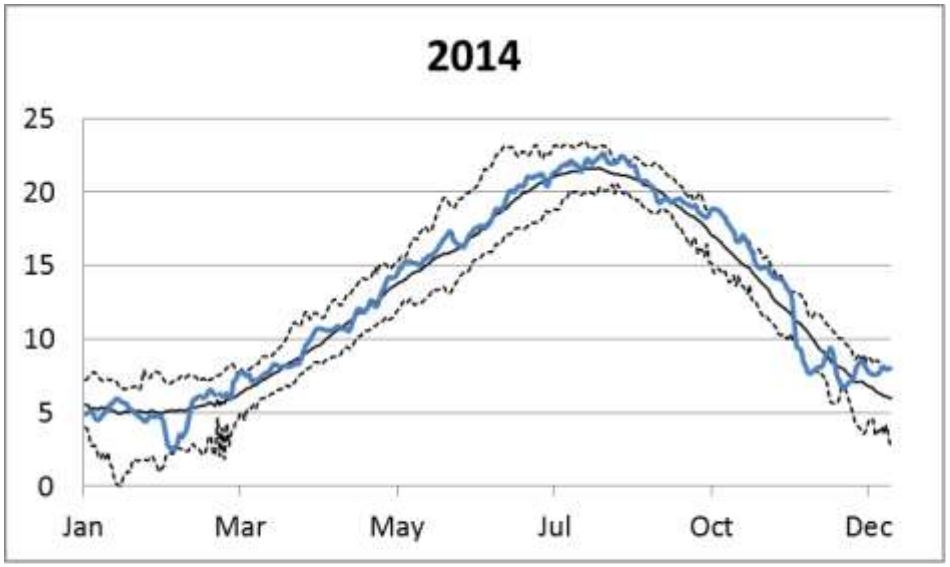


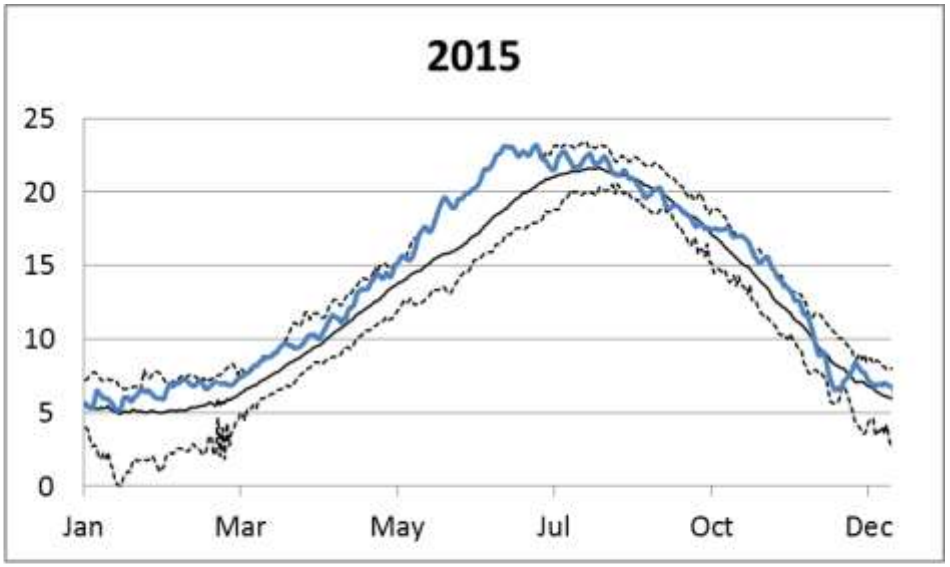


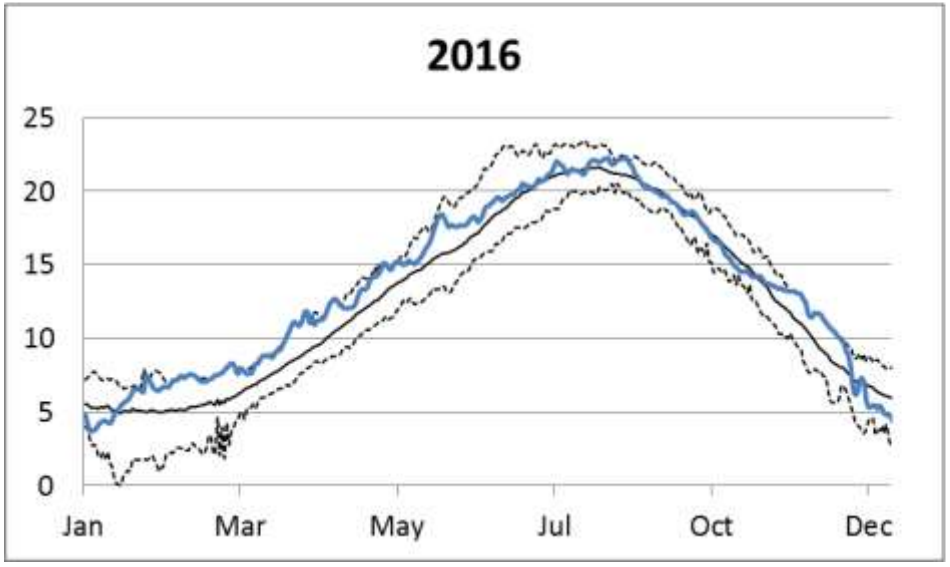


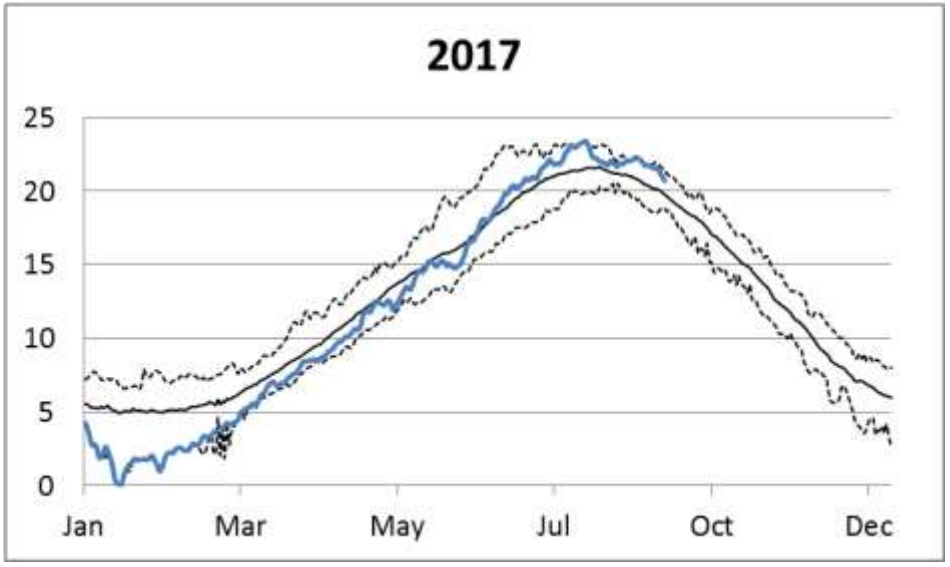


Mainstem Temperature









Variables related to water temperature

Year	EOT-US	EOT-DS	Upwelling	R-Temp	Freshet	CRB SWE	CRB Precip	PDX air temp
Avg	24 ± 13	25 ± 36	-3.0 ± 0.8	76 ± 12	7.0 ± 2.0	105 ± 29	102 ± 19	37 ± 14
1997	54 (2.3)	56 (0.9)	-1.7 (1.5)	69 (-0.5)	10.7 (1.9)	163 (2.0)	147 (2.4)	52 (1.07)
1998	13 (-0.8)	90 (1.8)	-3.0 (-0.0)	85 (0.76)	7.5 (0.3)	99 (-0.1)	94 (-0.3)	48 (0.79)
1999	2 (-1.7)	0 (-0.6)	-2.9 (0.0)	58 (-1.4)	8.3 (0.7)	157 (1.8)	128 (1.4)	34 (-0.2)
2000	28 (0.3)	5 (-0.5)	-2.7 (0.3)	81 (0.44)	6.1 (-0.5)	114 (0.4)	102 (0.1)	31 (-0.4)
2001	22 (-0.1)	0 (-0.6)	-2.7 (0.3)	86 (0.85)	3.6 (-1.8)	60 (-1.4)	60 (-2.0)	24 (-0.9)
2002	9 (-1.1)	0 (-0.6)	-3.8 (-1.0)	73 (-0.2)	7.2 (0.1)	126 (0.8)	108 (0.4)	28 (-0.6)
2003	11 (-1.0)	22 (-0.0)	-3.4 (-0.5)	82 (0.52)	6.3 (-0.4)	88 (-0.5)	92 (-0.4)	44 (0.50)
2004	33 (0.7)	1 (-0.6)	-1.7 (1.5)	81 (0.44)	6.1 (-0.5)	95 (-0.3)	93 (-0.3)	51 (1.00)
2005	42 (1.4)	23 (-0.0)	-3.3 (-0.5)	79 (0.27)	5.6 (-0.7)	59 (-1.5)	72 (-1.4)	38 (0.07)
2006	23 (-0.1)	0 (-0.6)	-5.1 (-2.7)	77 (0.11)	7.4 (0.2)	135 (1.1)	118 (0.9)	33 (-0.2)
2007	35 (0.8)	3 (-0.6)	-3.0 (-0.0)	77 (0.11)	6.1 (-0.5)	83 (-0.7)	103 (0.1)	40 (0.21)
2008	13 (-0.8)	7 (-0.4)	-3.6 (-0.8)	72 (-0.2)	7.7 (0.4)	141 (1.3)	113 (0.6)	36 (-0.0)
2009	20 (-0.3)	0 (-0.6)	-2.8 (0.1)	85 (0.76)	6.3 (-0.3)	112 (0.3)	99 (-0.0)	54 (1.22)
2010	23 (-0.1)	18 (-0.1)	-2.7 (0.3)	47 (-2.3)	6.3 (-0.4)	77 (-0.9)	77 (-1.1)	27 (-0.7)
2011	13 (-0.8)	26 (0.0)	-2.9 (0.1)	59 (-1.3)	10.4 (1.7)	130 (0.9)	121 (1.1)	38 (0.07)
2012	15 (-0.7)	0 (-0.6)	-3.2 (-0.3)	59 (-1.3)	9.2 (1.2)	119 (0.5)	109 (0.5)	38 (0.07)
2013	42 (1.4)	14 (-0.2)	-2.9 (0.1)	84 (0.68)	6.7 (-0.1)	88 (-0.5)	96 (-0.2)	57 (1.43)
2014	31 (0.5)	73 (1.3)	-3.4 (-0.5)	86 (0.85)	7.3 (0.1)	103 (-0.0)	97 (-0.1)	60 (1.65)
2015	33 (0.7)	134 (3.0)	-4.4 (-1.7)	102 (2.15)	4.7 (-1.1)	44 (-2.0)	92 (-0.4)	66 (2.08)
2016	n/a	n/a	-3.6	85 (0.72)	5.5 (-0.7)	105 (0.03)	114 (0.61)	49 (0.86)
2017	n/a	n/a	-3.5	78 (0.15)	8.7 (0.9)	120 (0.55)	138 (1.85)	45 (0.57)

Record year

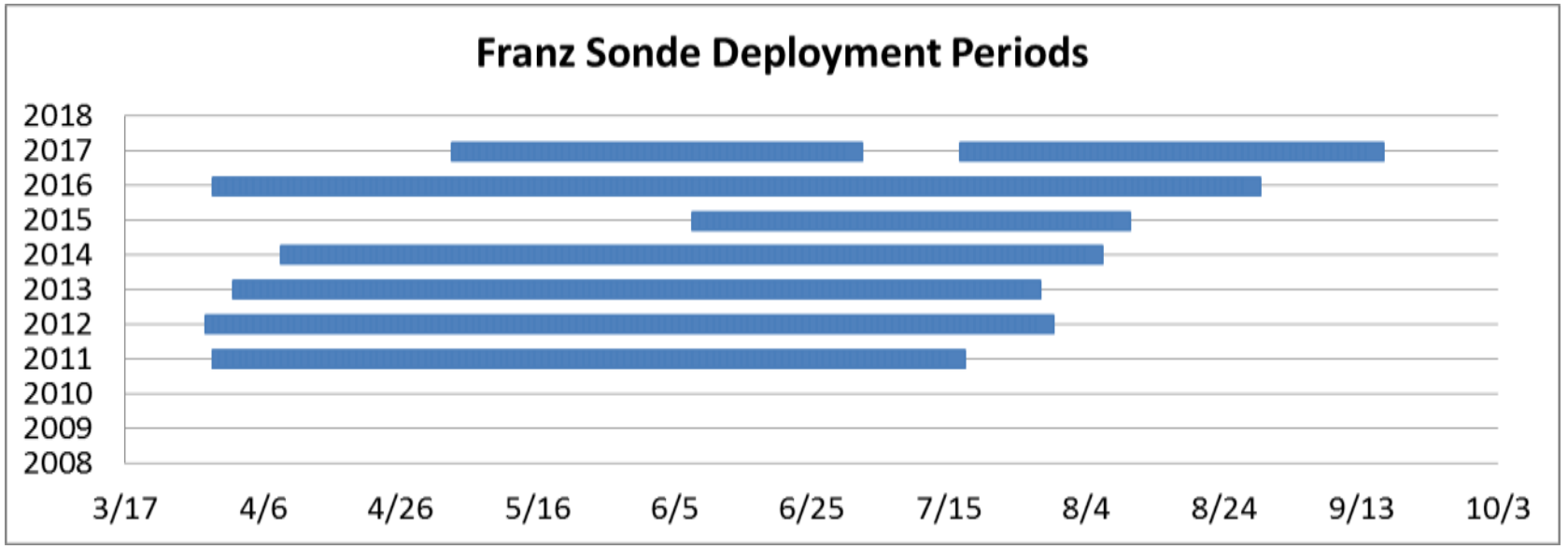
Runner up

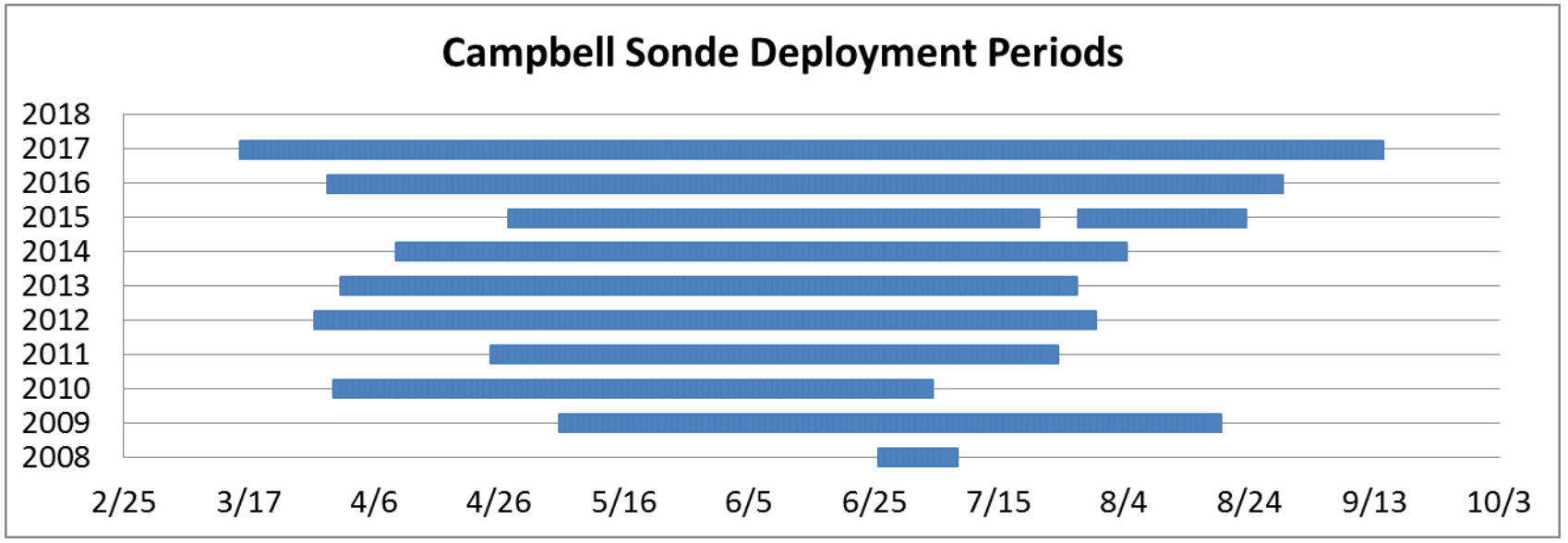
2015 ranked high in 5 of 8 categories

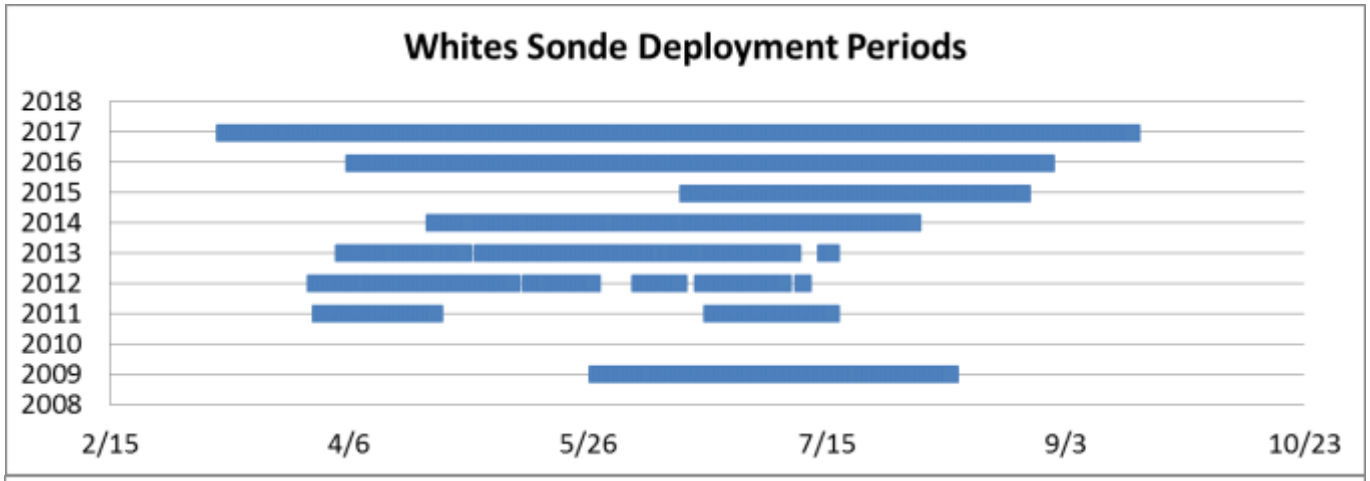
Off-channel habitats 2015 vs 2017

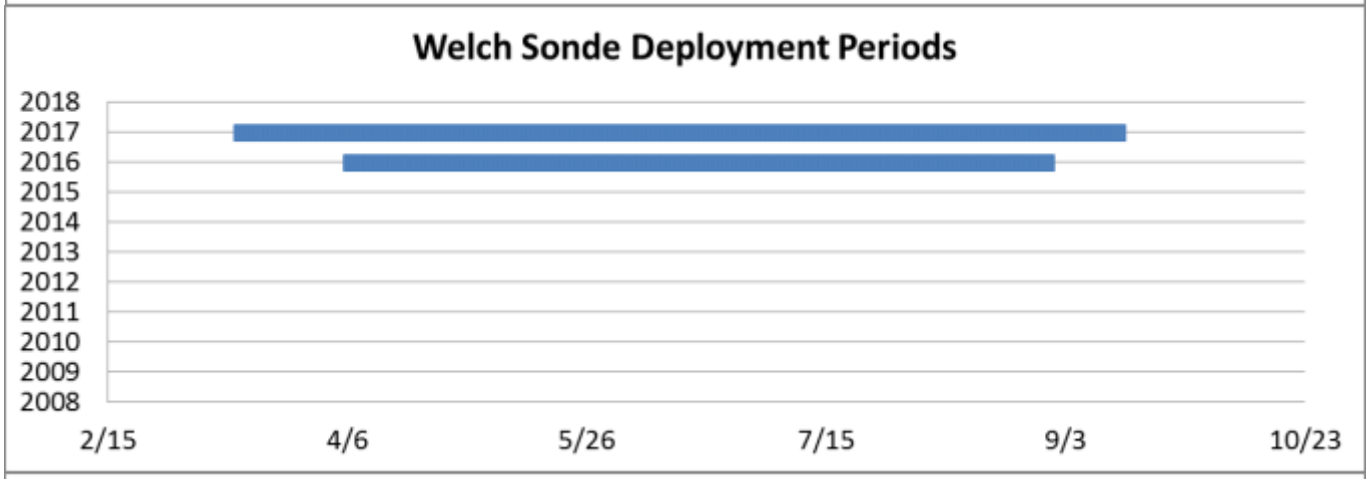
Off-channel habitats 2015-2017

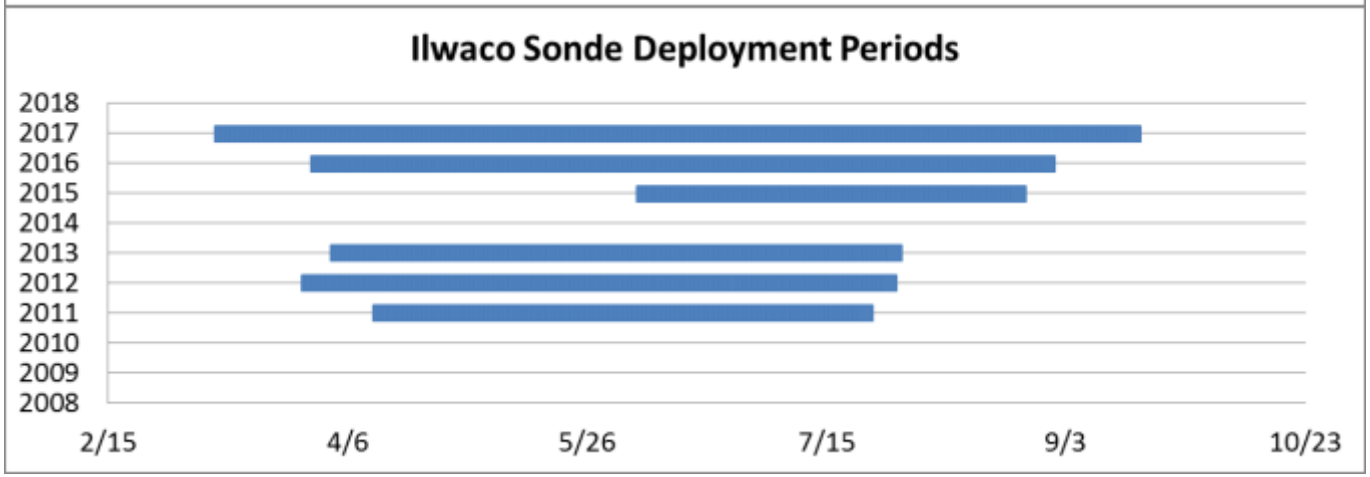
EMP YSI Sonde Deployments



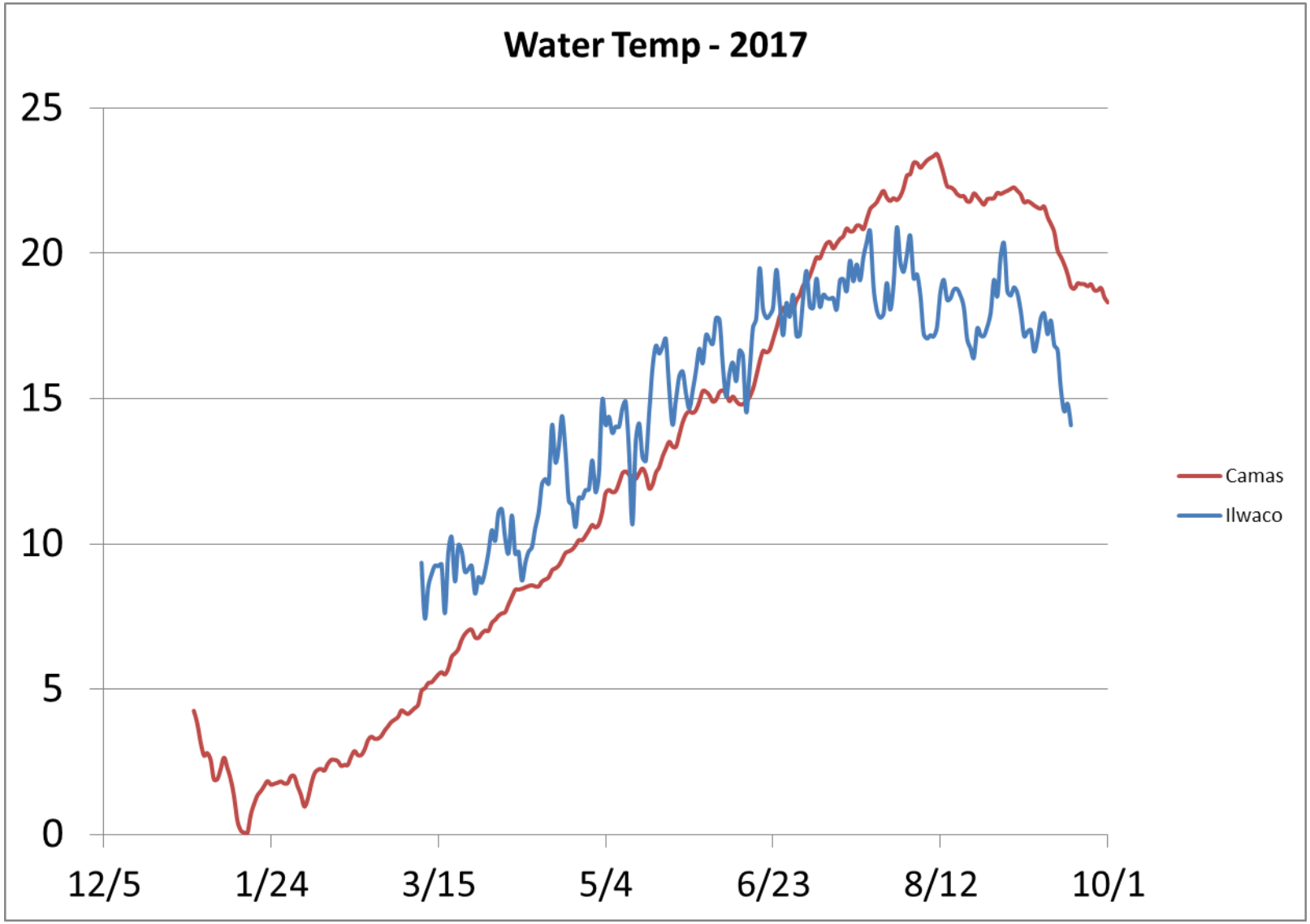


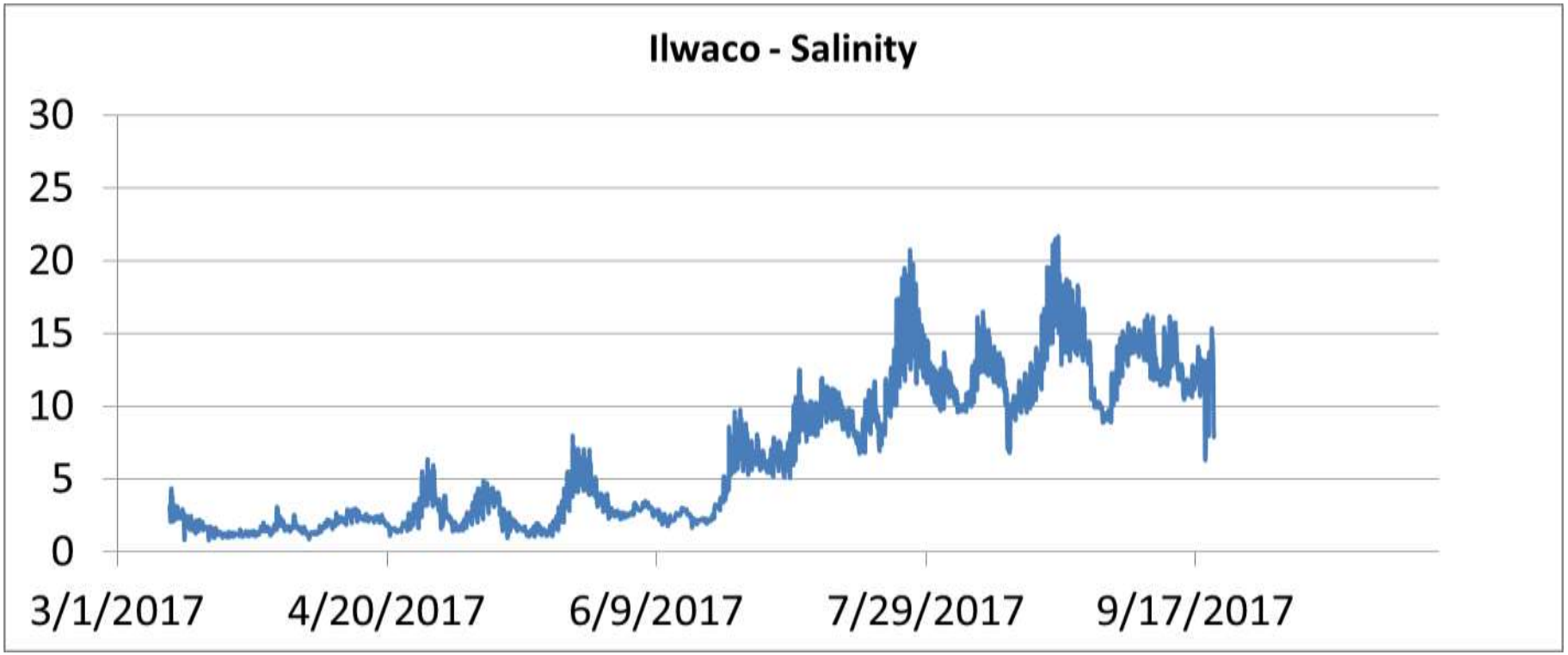

Whites Sonde Deployment Periods
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2/15
4/6
5/26
7/15
9/3
10/23


Welch Sonde Deployment Periods
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2/15
4/6
5/26
7/15
9/3
10/23

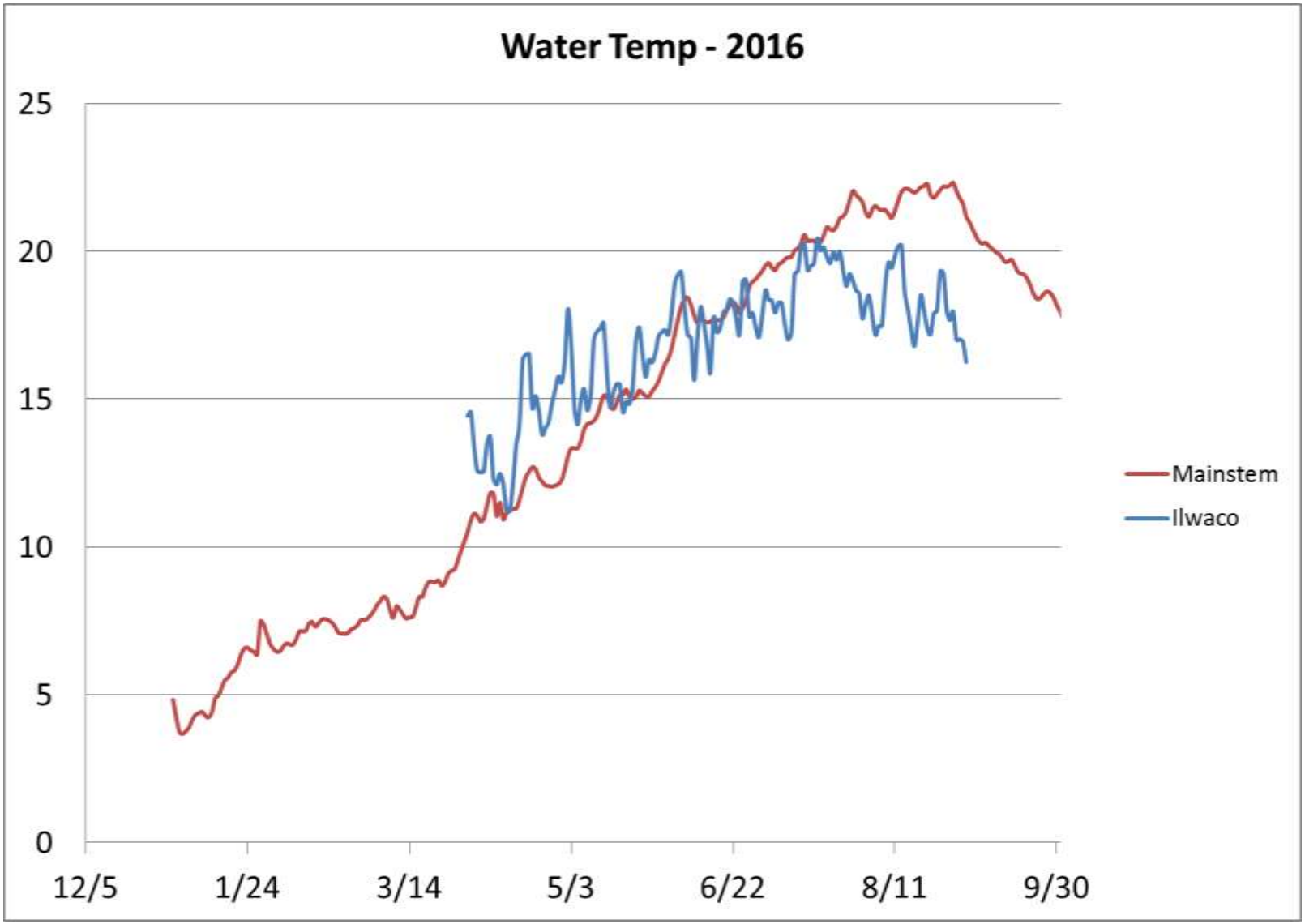

Ilwaco Sonde Deployment Periods
2018
2017
2016
2015
2014
2013
2012
2011
2010
2009
2008
2/15
4/6
5/26
7/15
9/3
10/23

Ilwaco – high connectivity/ocean influence

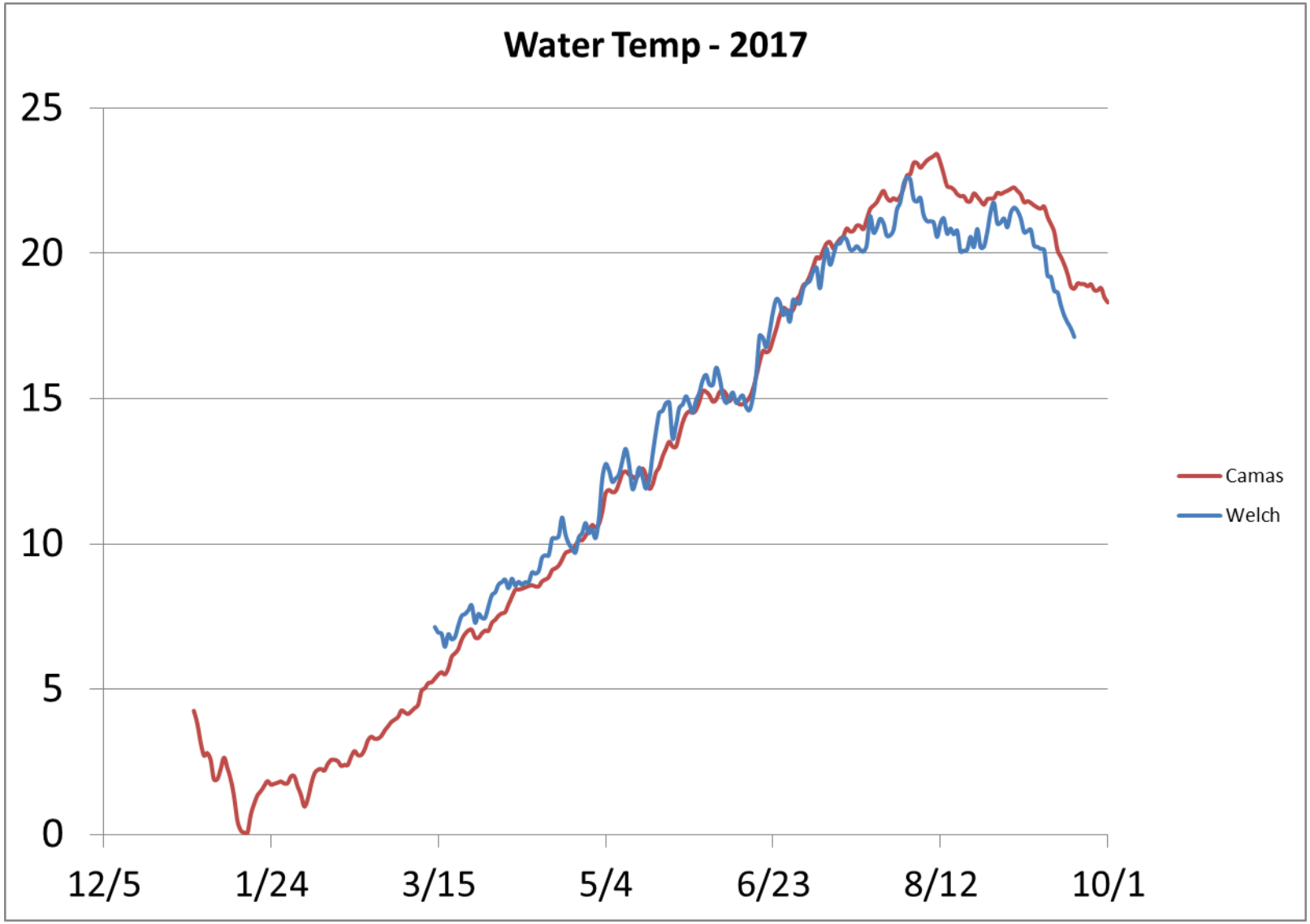



Ilwaco - Salinity
30
25
20
15
10
5
0
3/1/2017
4/20/2017
6/9/2017
7/29/2017
9/17/2017

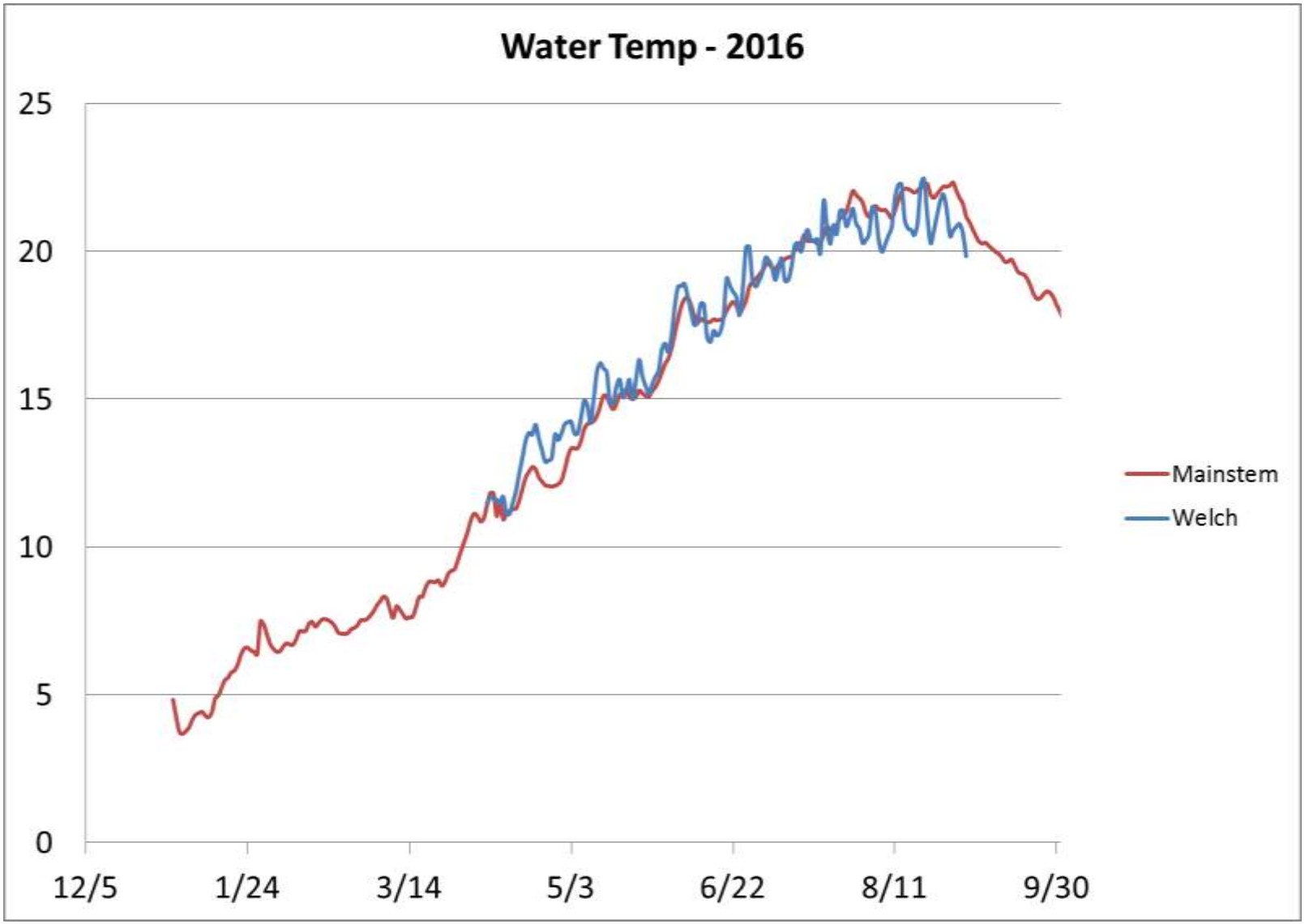
Ilwaco – high connectivity/ocean influence



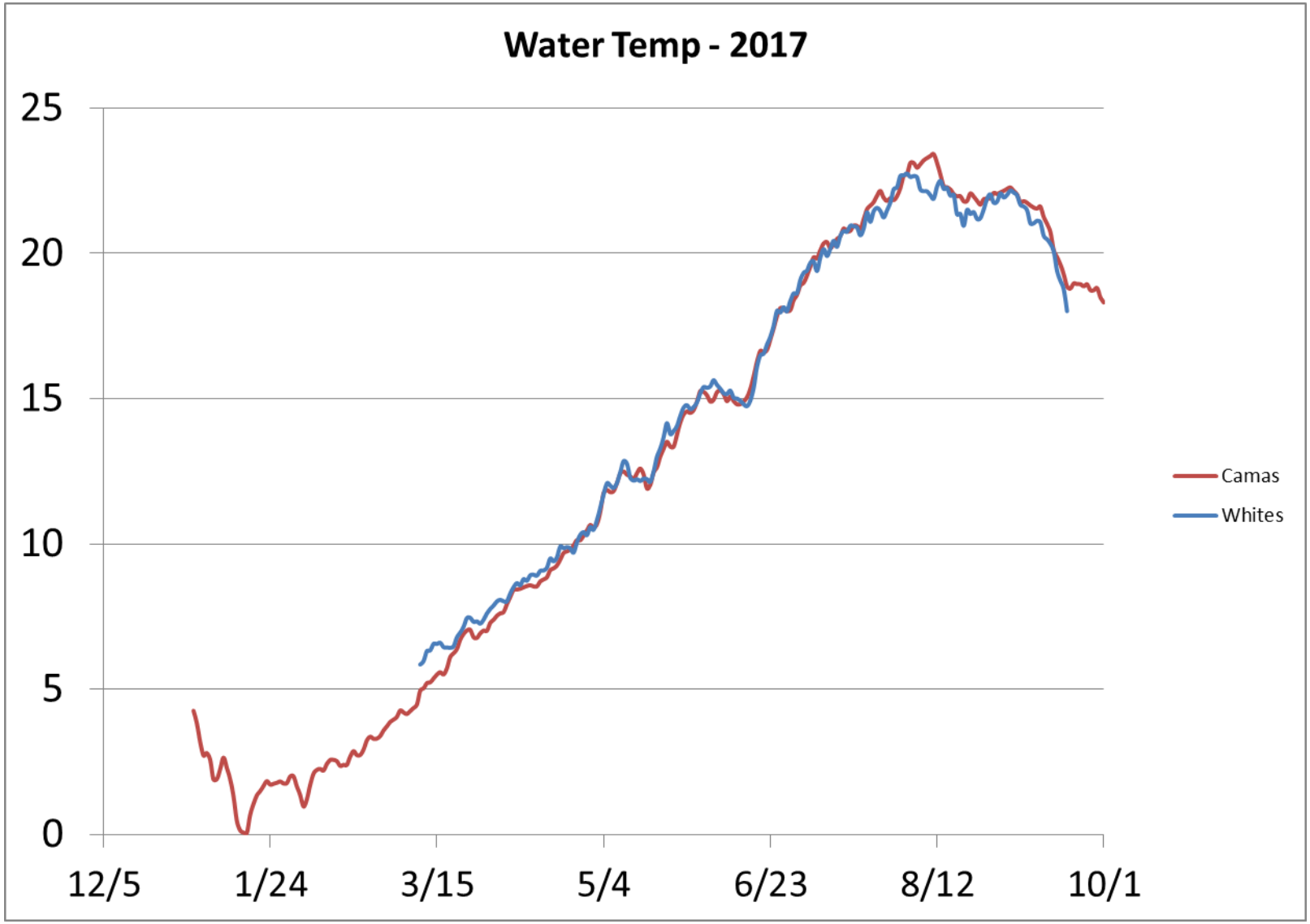
Welch – high connectivity



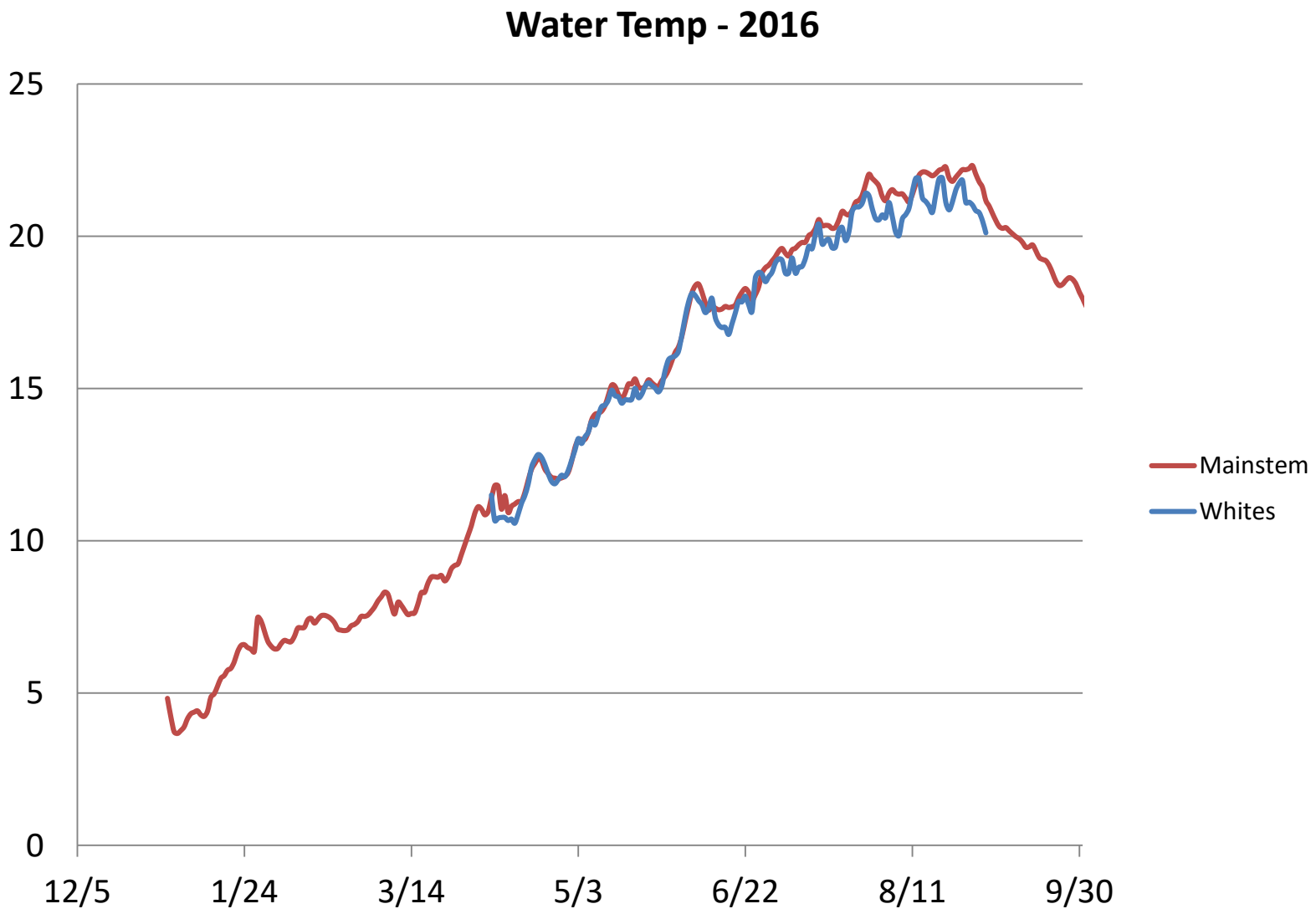
Welch – high connectivity



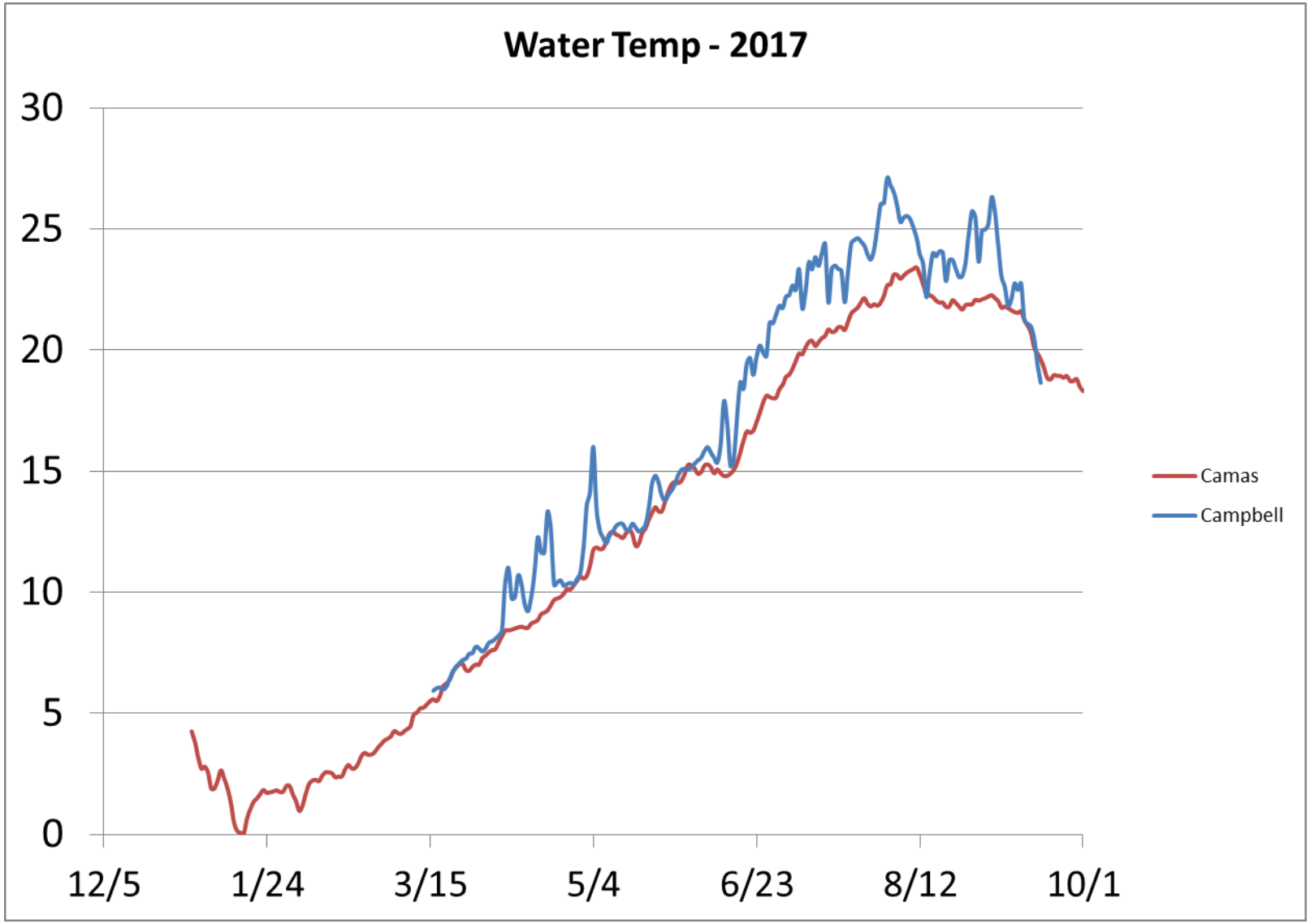
Whites – medium connectivity



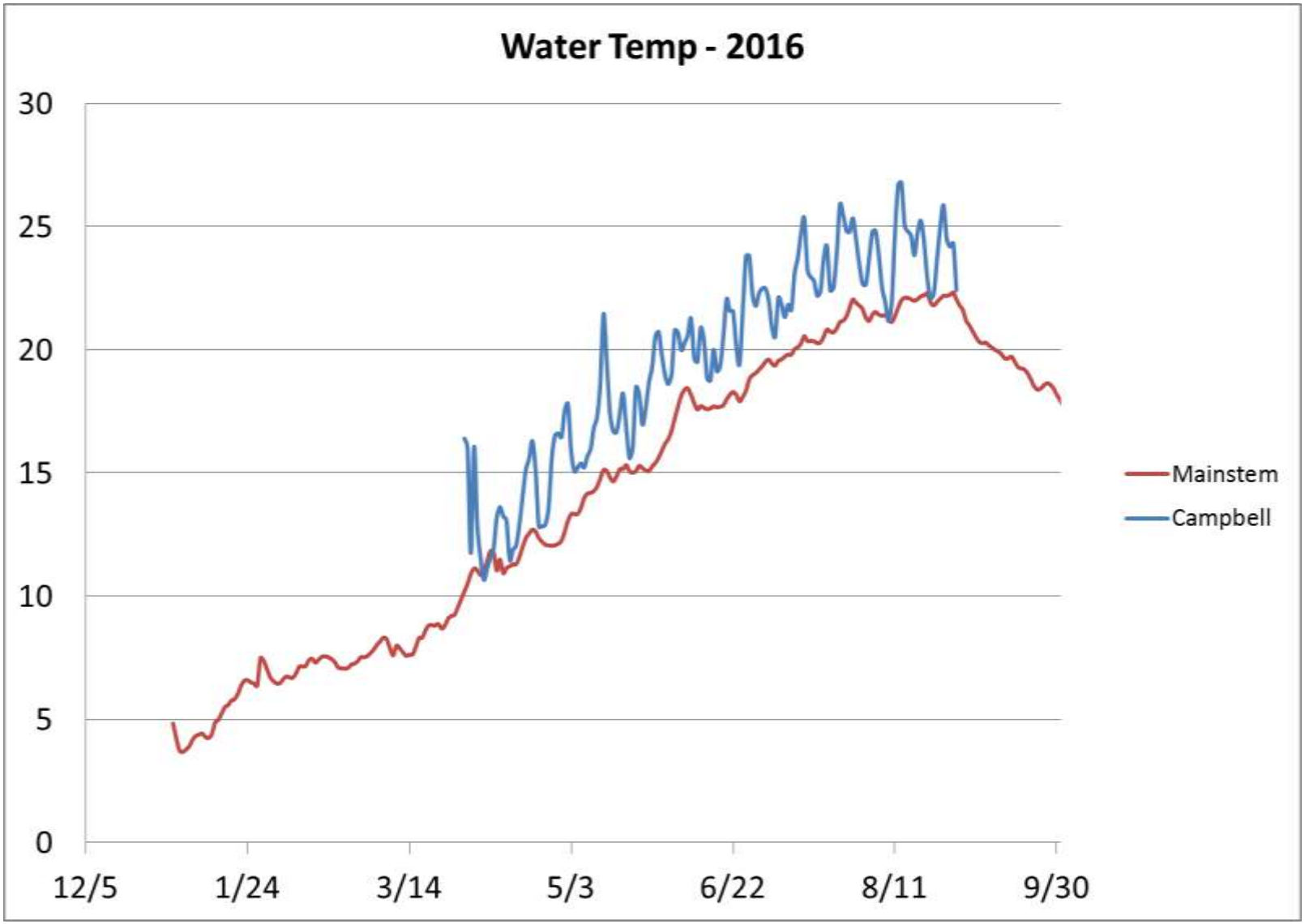
Whites – medium connectivity



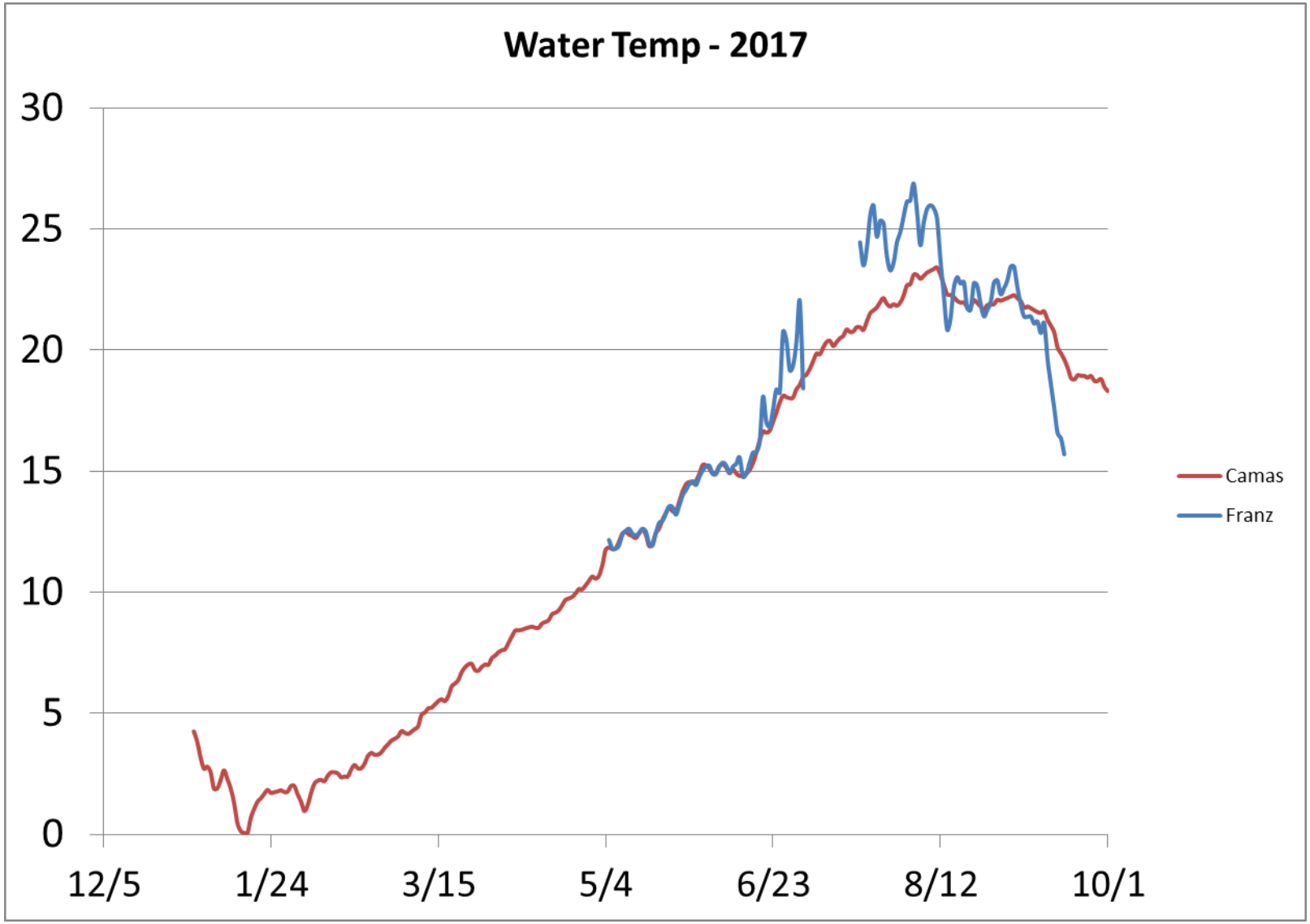
Campbell – low connectivity



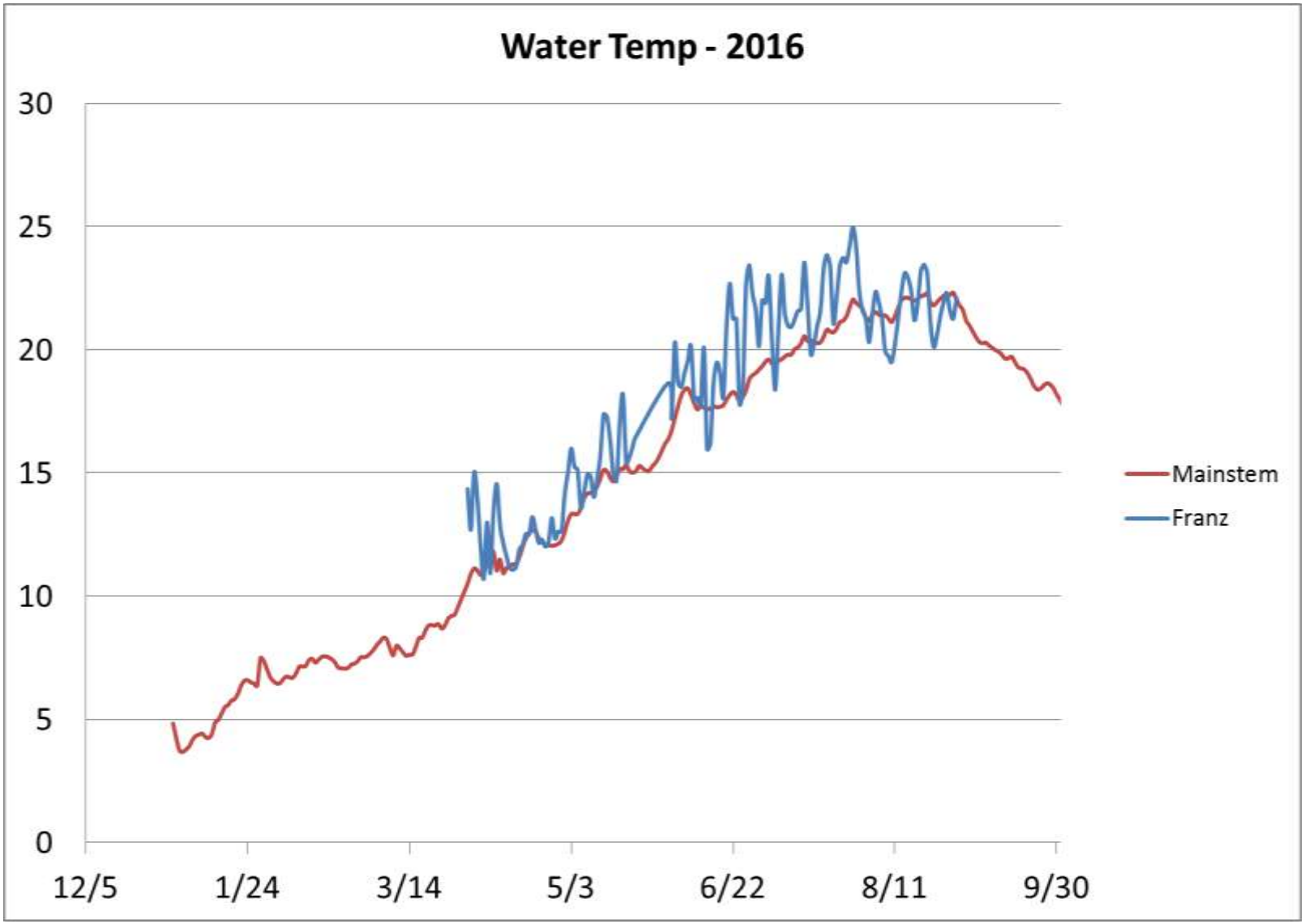
Campbell – Low connectivity



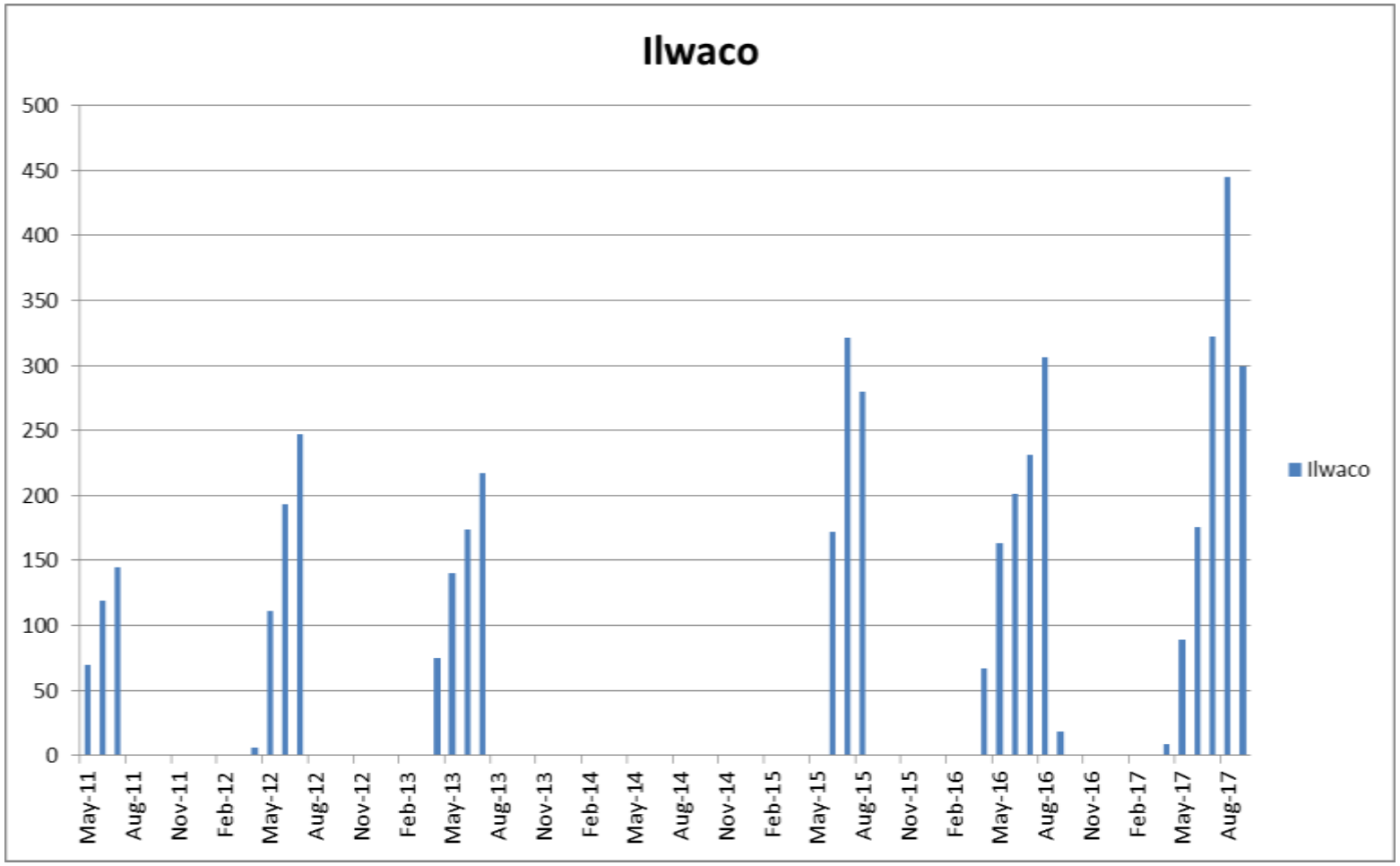
Franz – medium connectivity, beaver dam



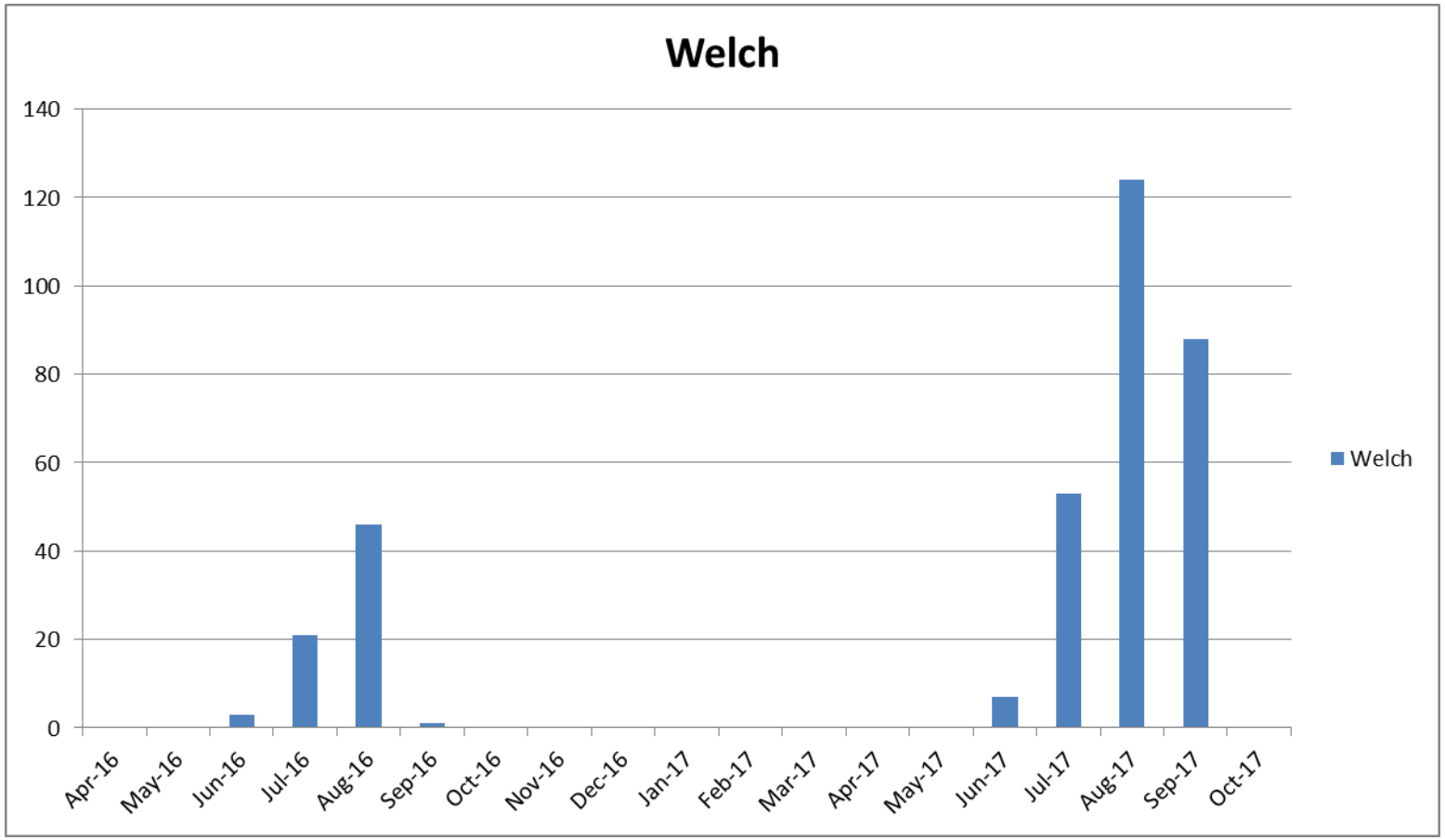
Franz – medium connectivity, beaver dam



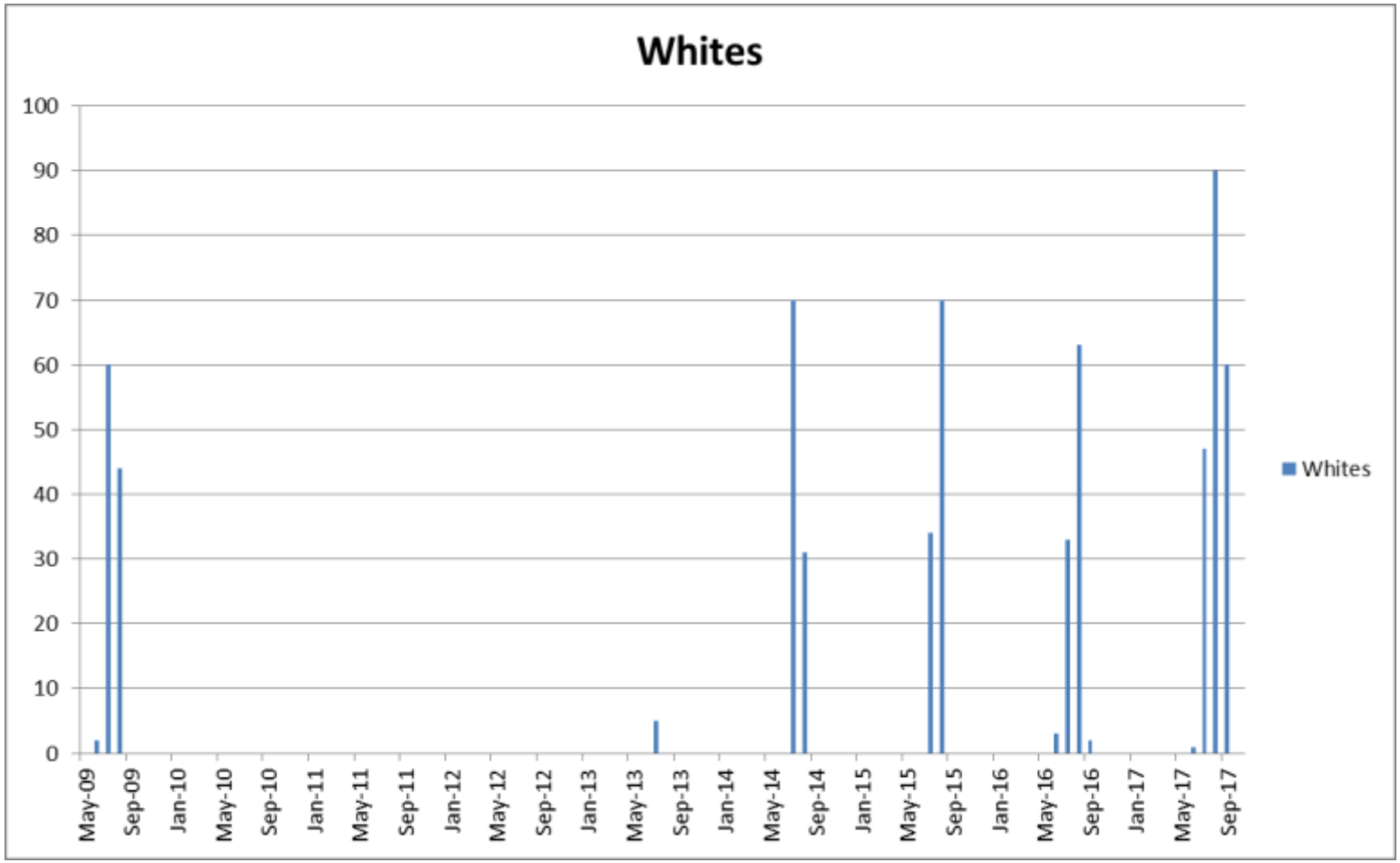
Dissolved Oxygen < 6 mg/L



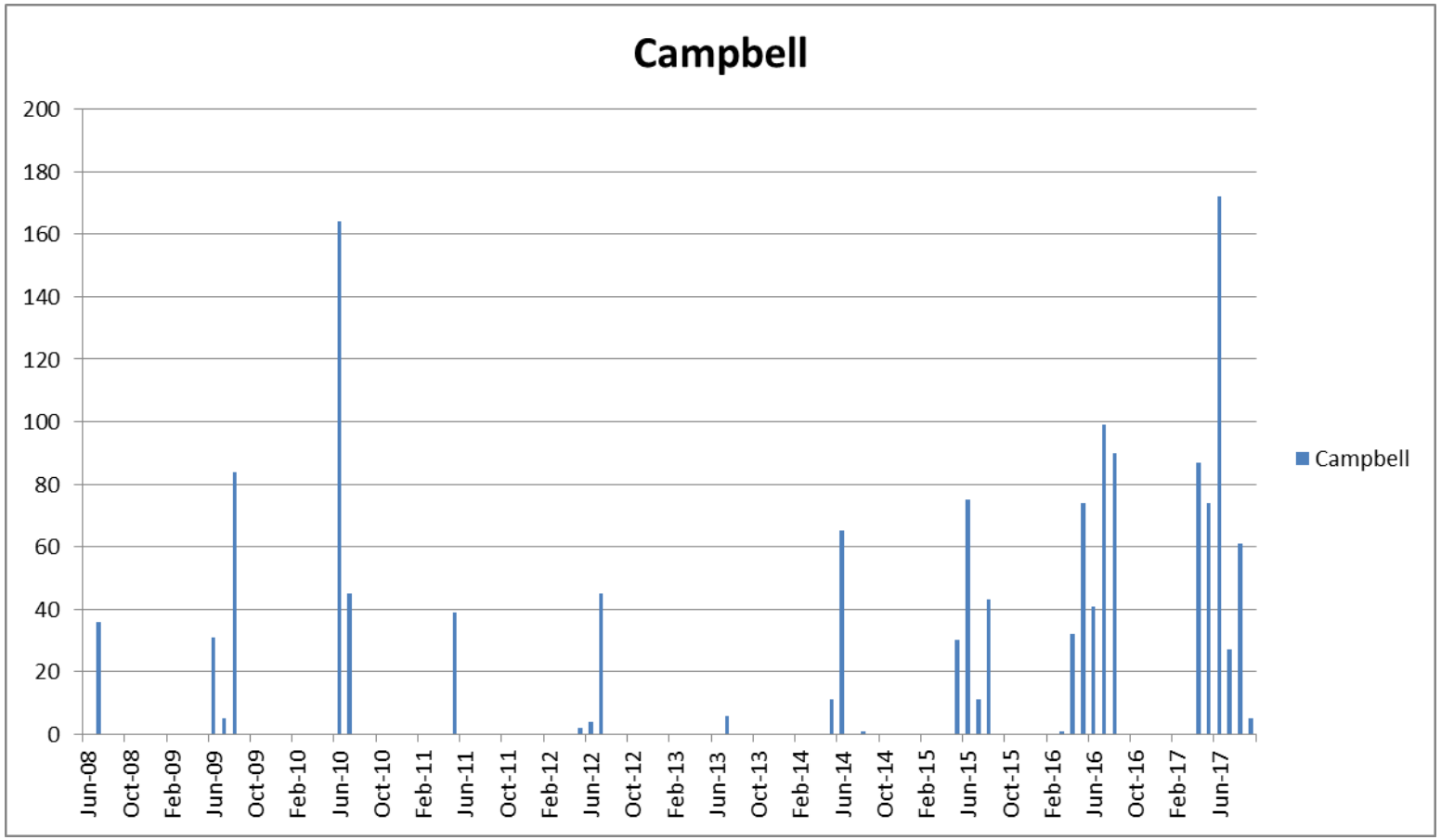
Dissolved Oxygen < 6 mg/L



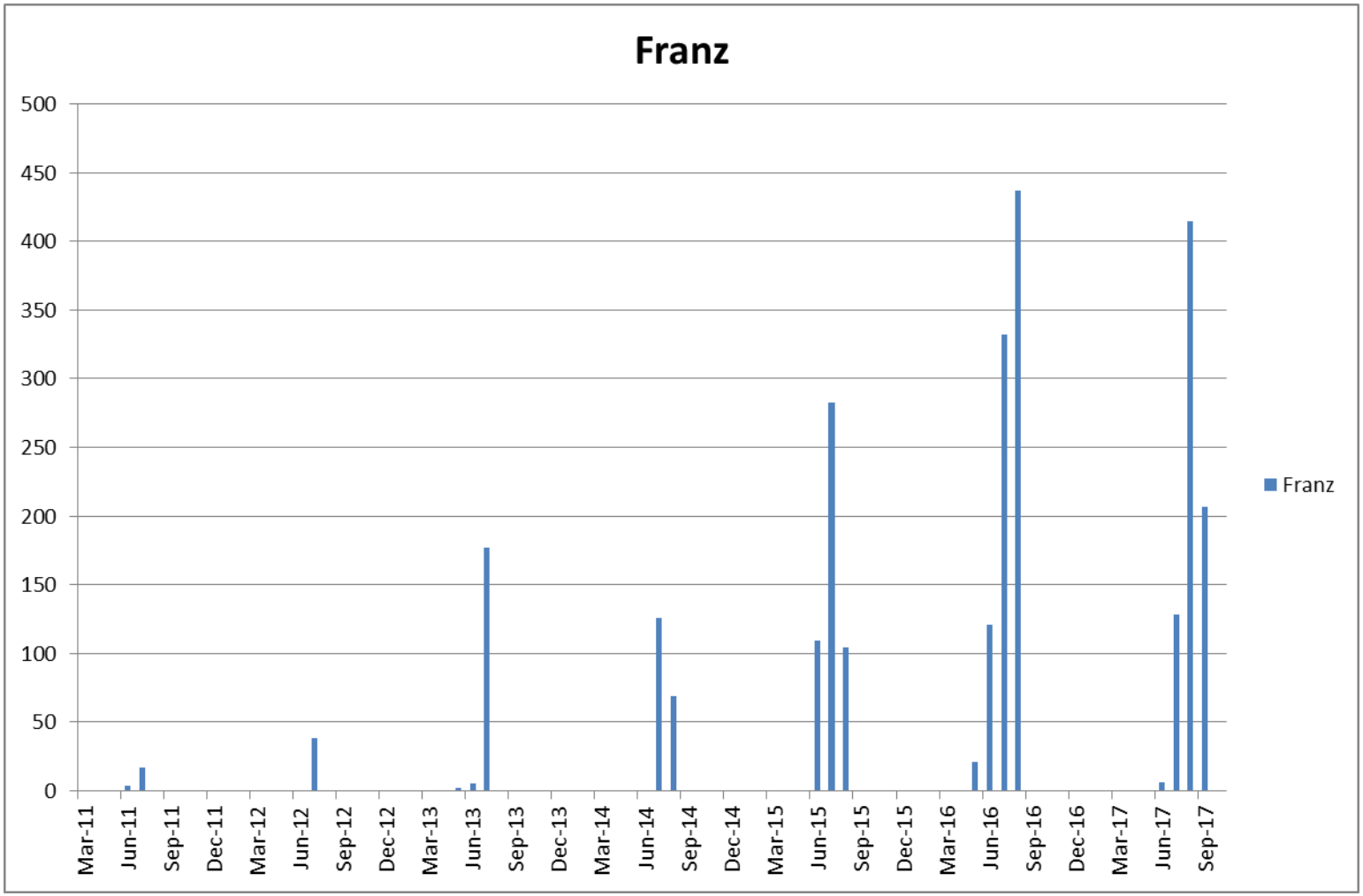
Dissolved Oxygen < 6 mg/L



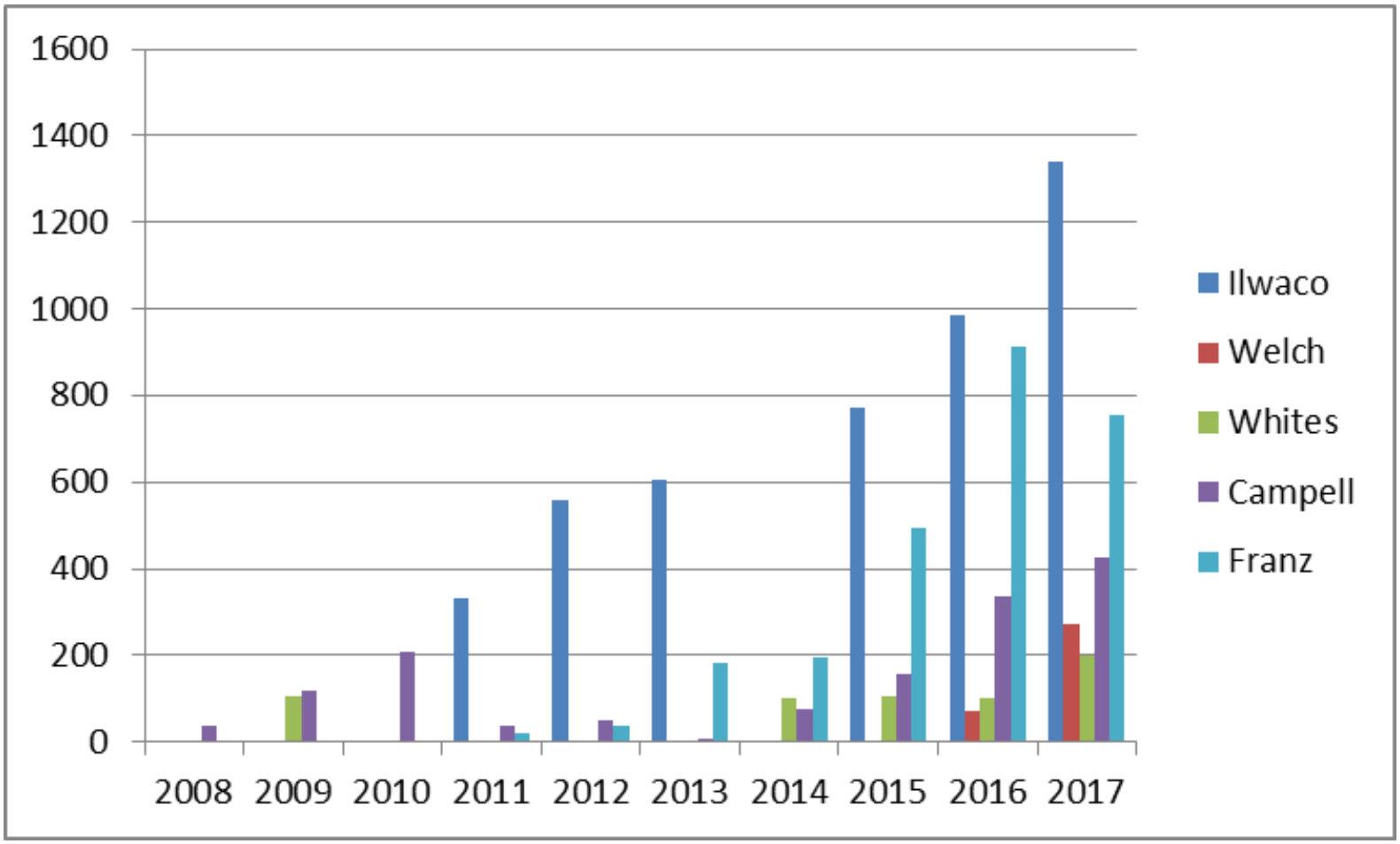
Dissolved Oxygen < 6 mg/L



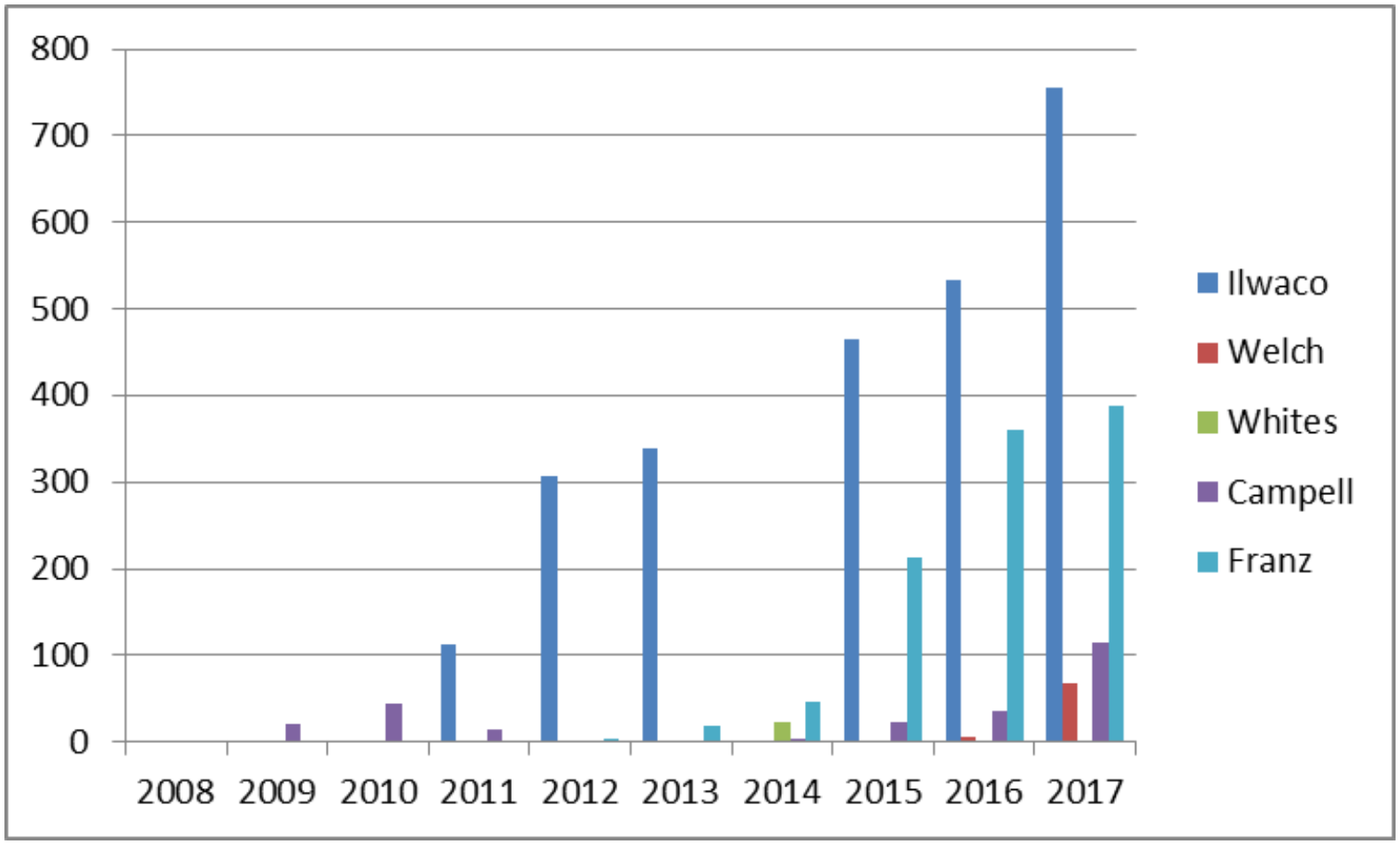
Dissolved Oxygen < 6 mg/L



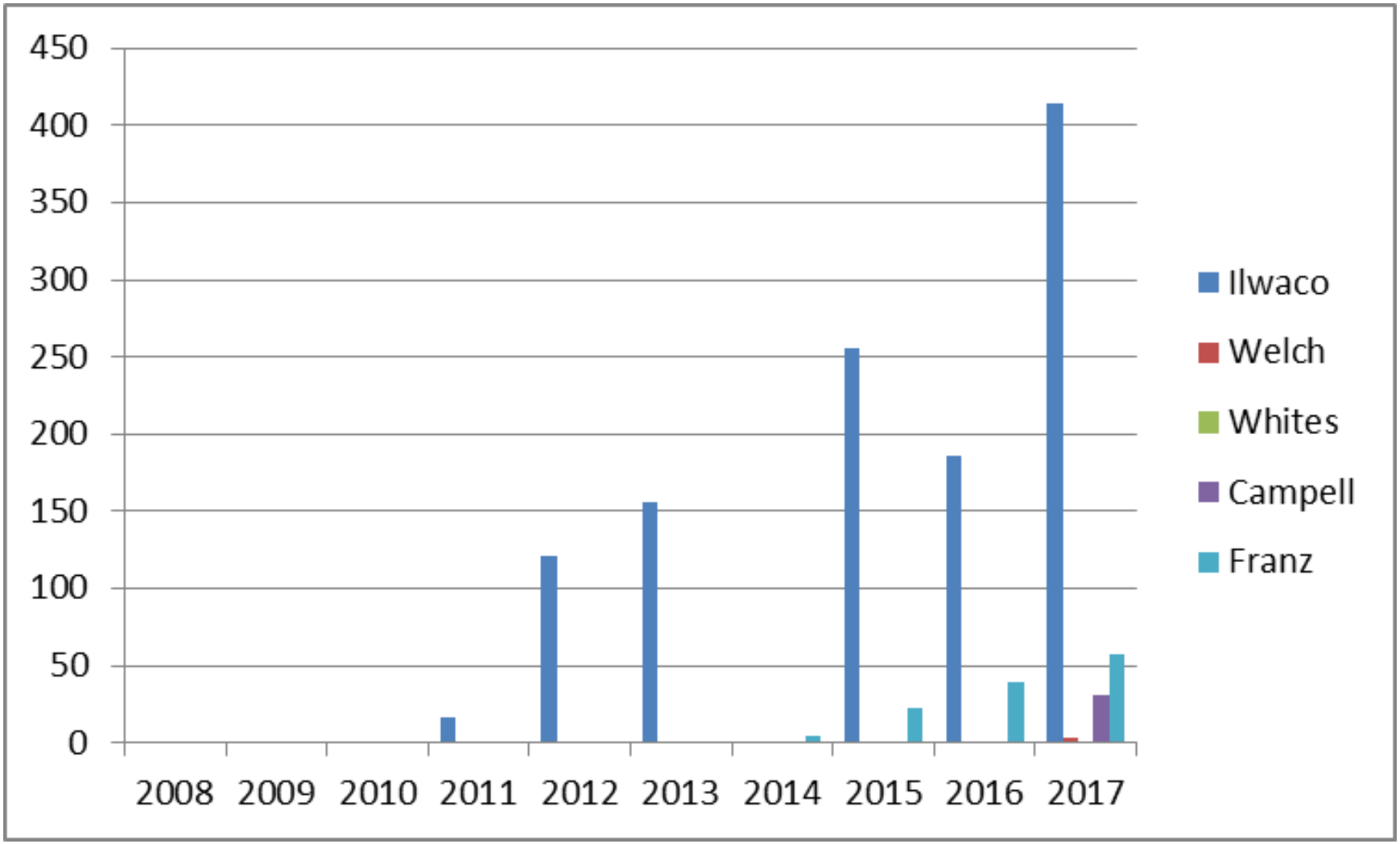
DO - # hours < 6 mg/L



DO - # hours < 4 mg/L



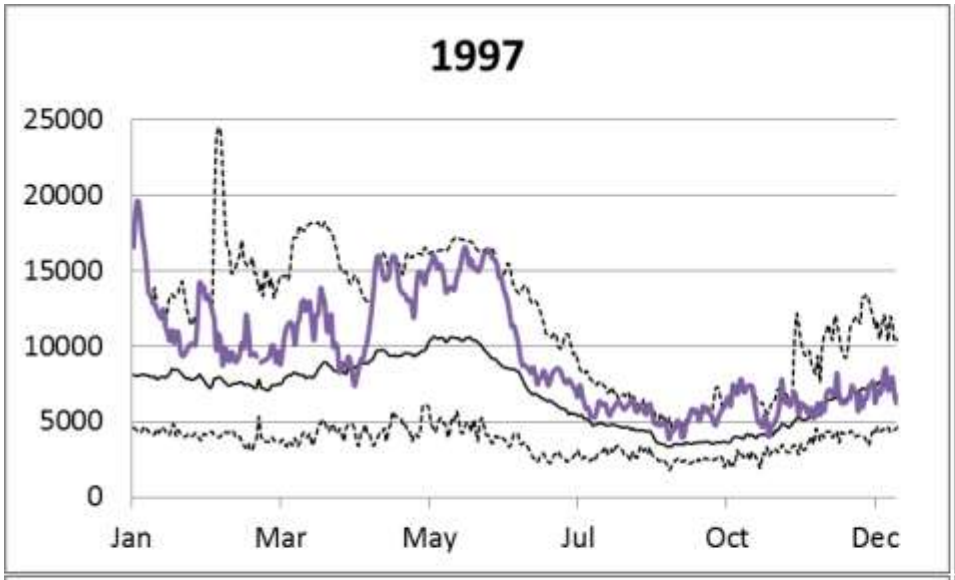
DO - # hours < 2 mg/L

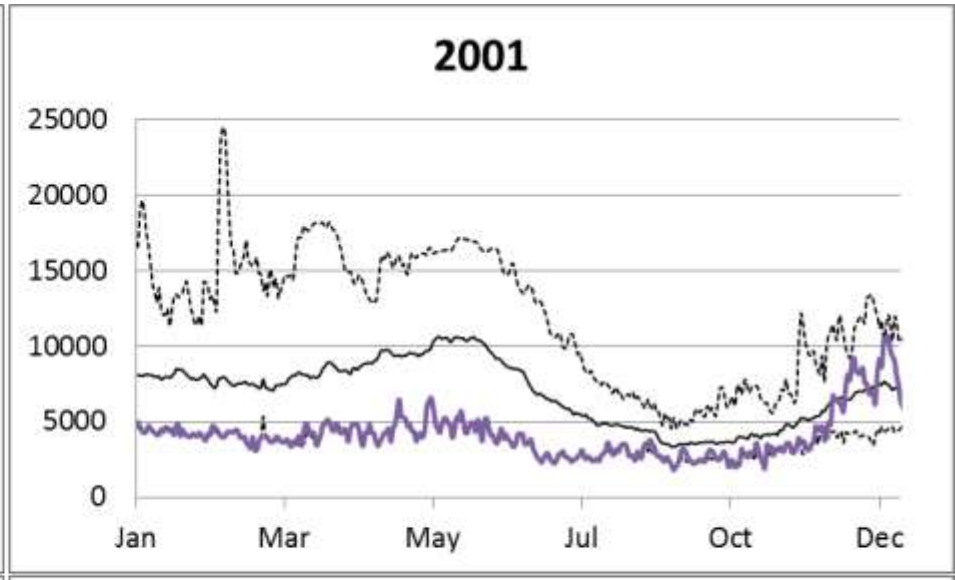


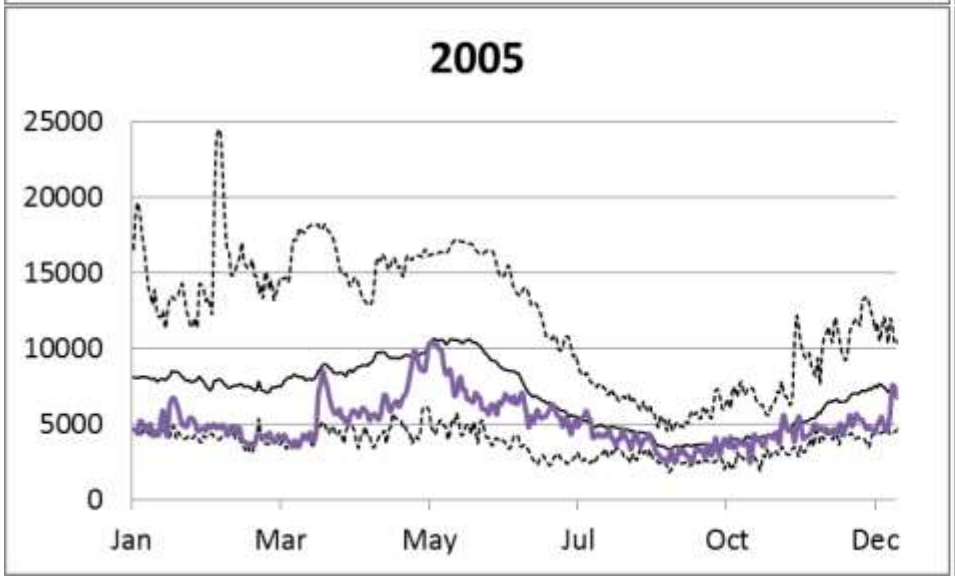
Summary

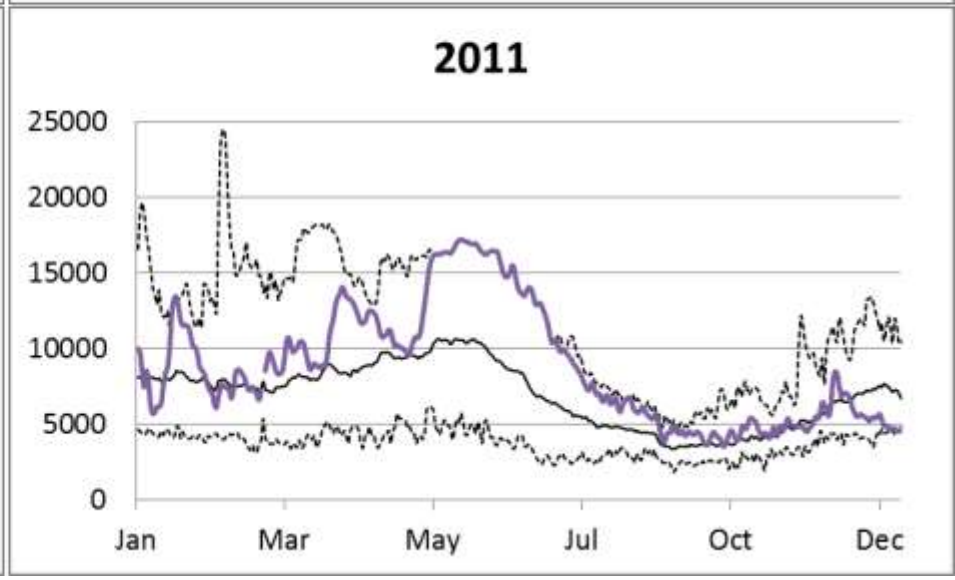
- 2015 – 2016 -2017 showed large range in river conditions
- Temperature gradients between main channel and sloughs dependent on discharge and connectivity
- Lower reaches have closer hydrologic connection due to tides
- Low oxygen conditions increasing over time

River Discharge at BAT









Mainstem Temperature