Warm Springs Creek Seepage Survey

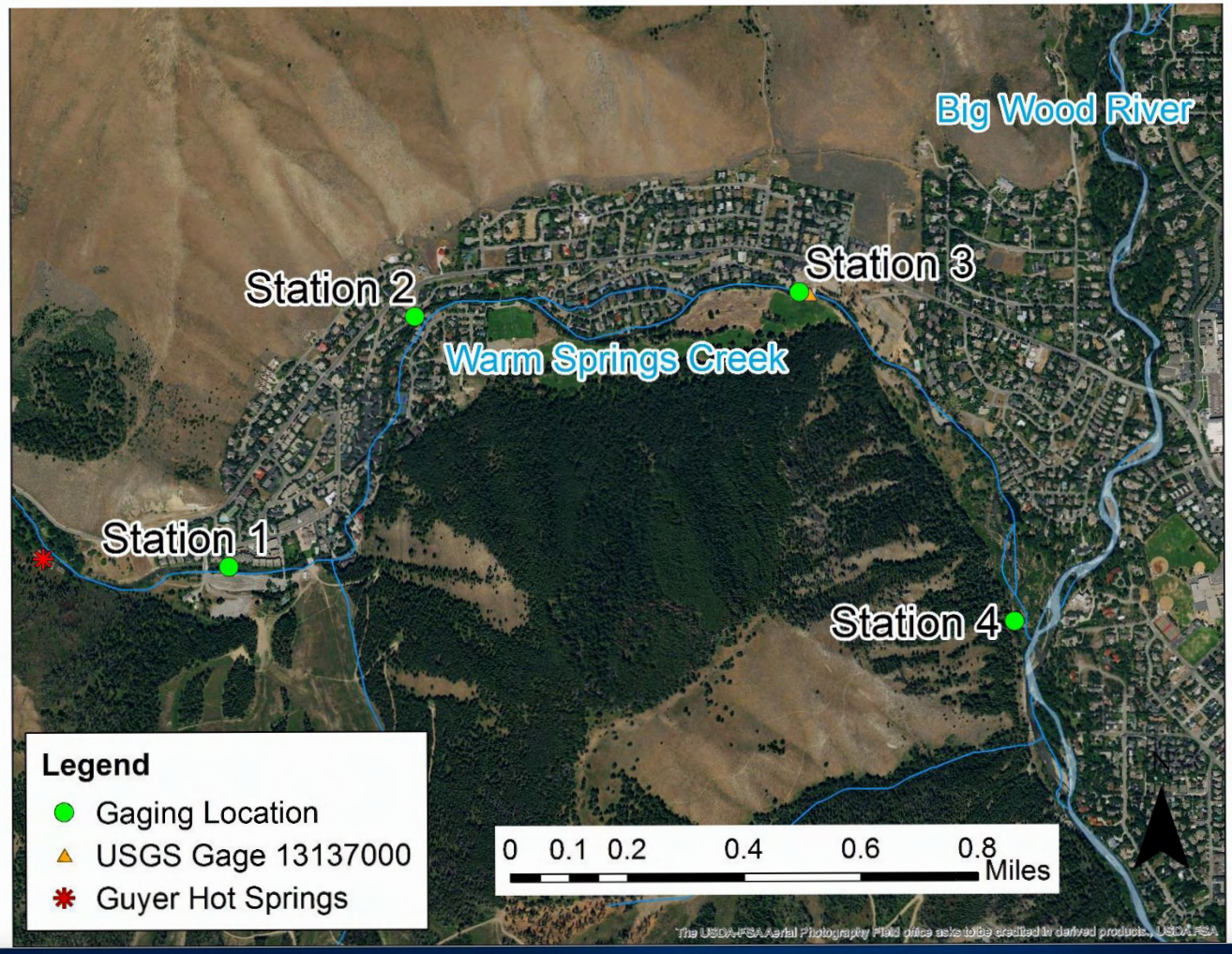
Presented by Will Parham

Wood River Valley MTAC

1/17/2019

IDAHO Department of Water Resources

Warm Springs Creek Seepage Survey
November 6, 2018



November 6, 2018 Seepage Survey

- Survey conducted by Will Parham (IWRRI), Paul Thomas (IWRRI), Dennis Owsley (IDWR), and Allan Wylie (IDWR)
- 2.16 miles of Warm Springs Creek
- No observed diversions or returns
- Low/base flow conditions
- Teledyne RDI StreamPro ADCP
- Report is in progress and will posted to the IDWR website

Station 1

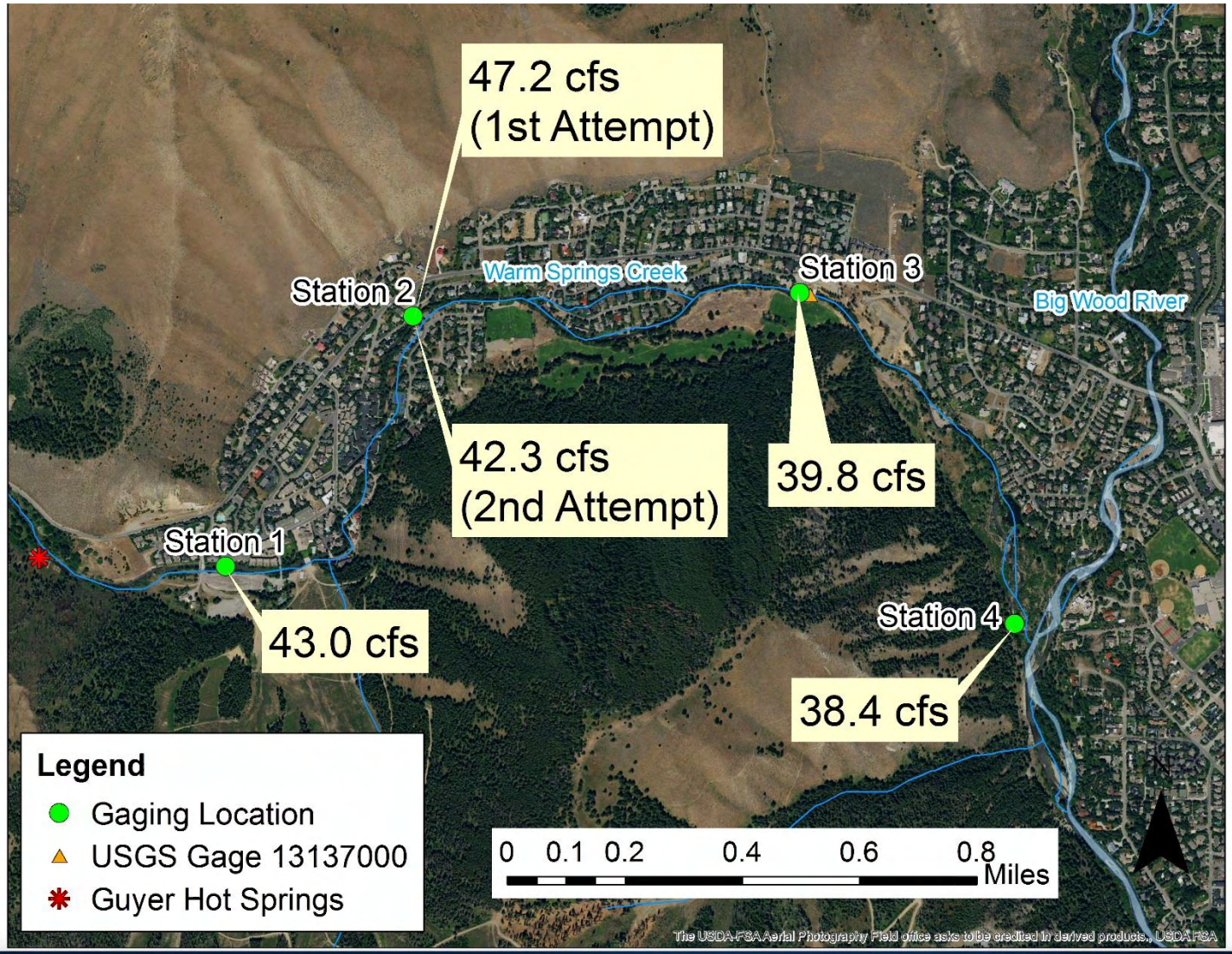
Station 1 (Thermal Water)

Station 2

Station 3

Station 4

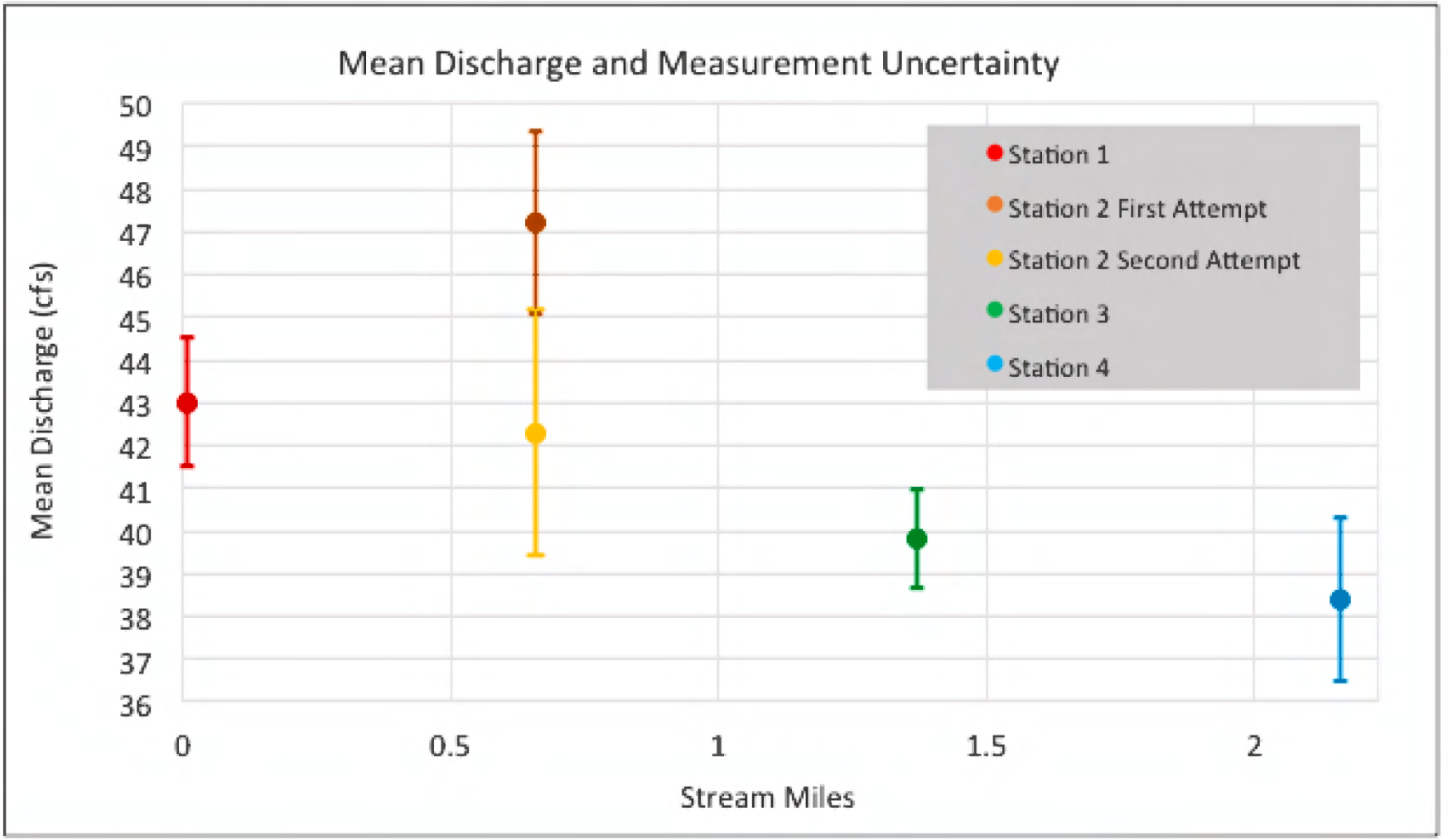
Discharge Results



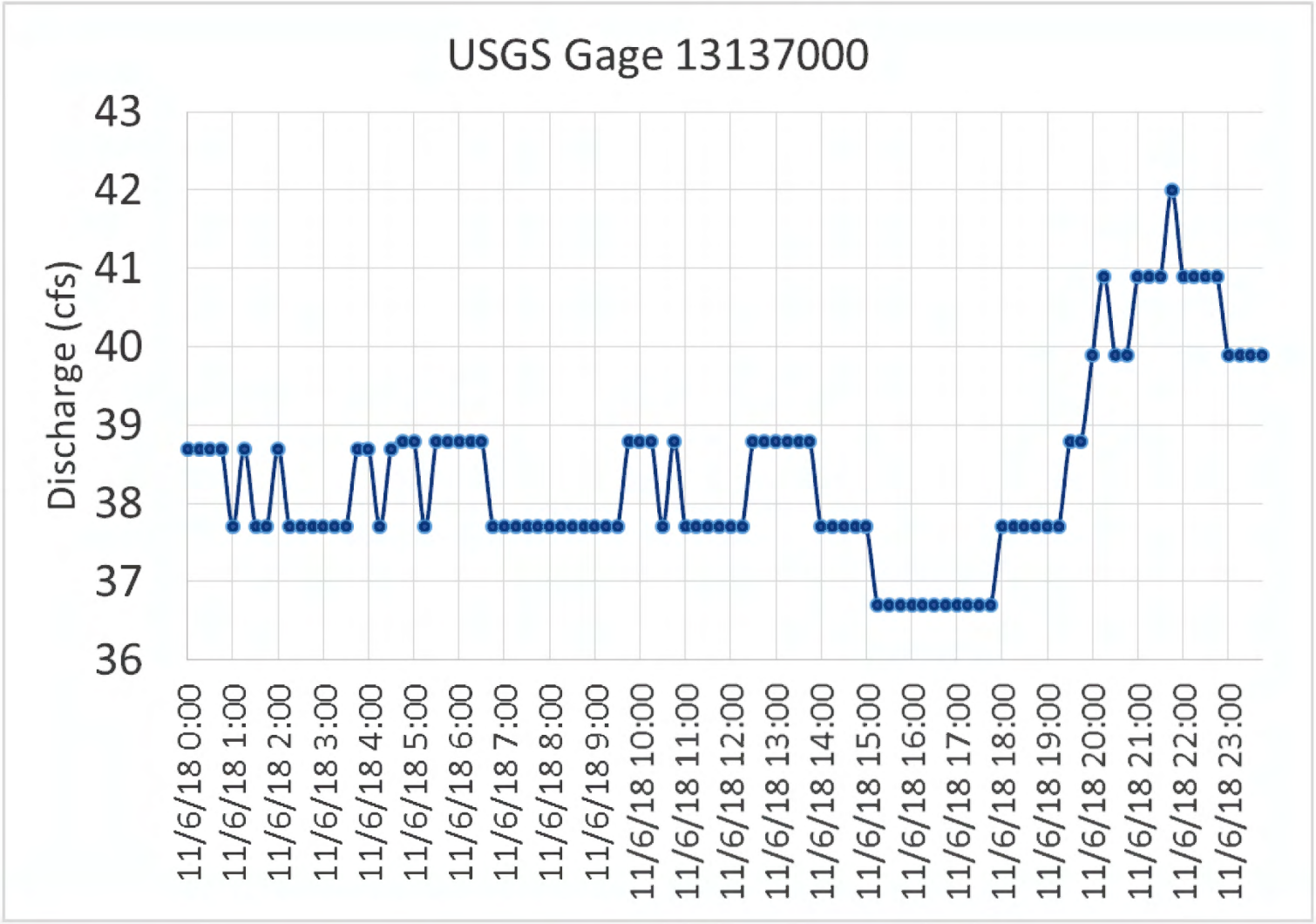
Location	Discharge (cfs)	Measurement Uncertainty (cfs)	Reach Gain and Loss (cfs)	Gain/Loss Rate (cfs/mile)	Reach Length (miles)
Station 1	43.0	± 1.5	-	-	-
Station 2 (1st Attempt)	47.2	± 2.1	4.2	6.36	0.66
Station 2 (2nd Attempt)	42.3	± 2.9	-0.7	-1.06	0.66
Station 3	39.8	± 1.2	-2.5	-3.52	0.71
Station 4	38.4	± 1.9	-1.4	-1.77	0.79

- Potential gains in Reach 1
- Potential losses in Reach 2 and Reach 3

Measurement Uncertainty



USGS Gage Consistency



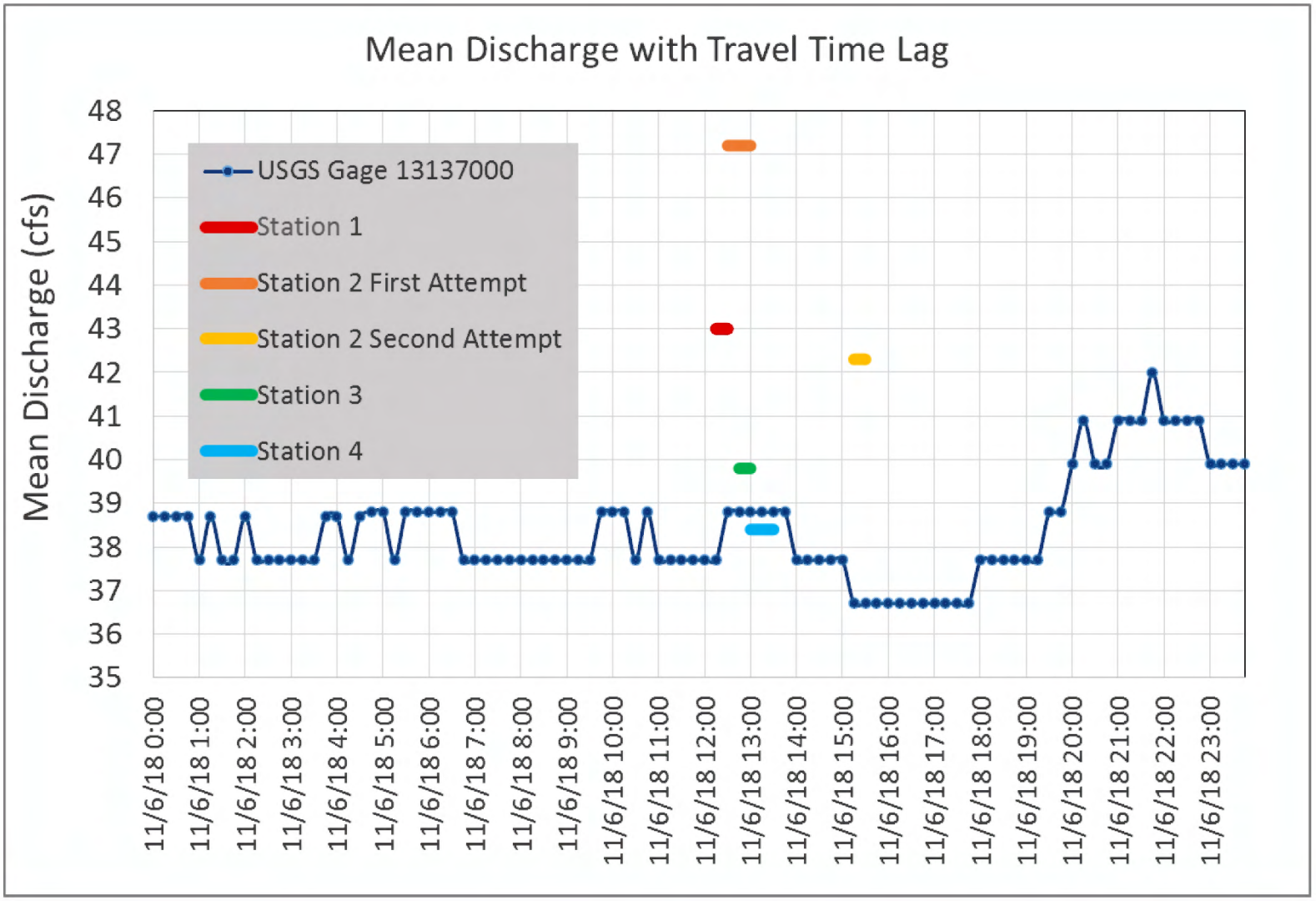
Travel Time Adjustment

When does the water measured at each station reach the USGS gage?

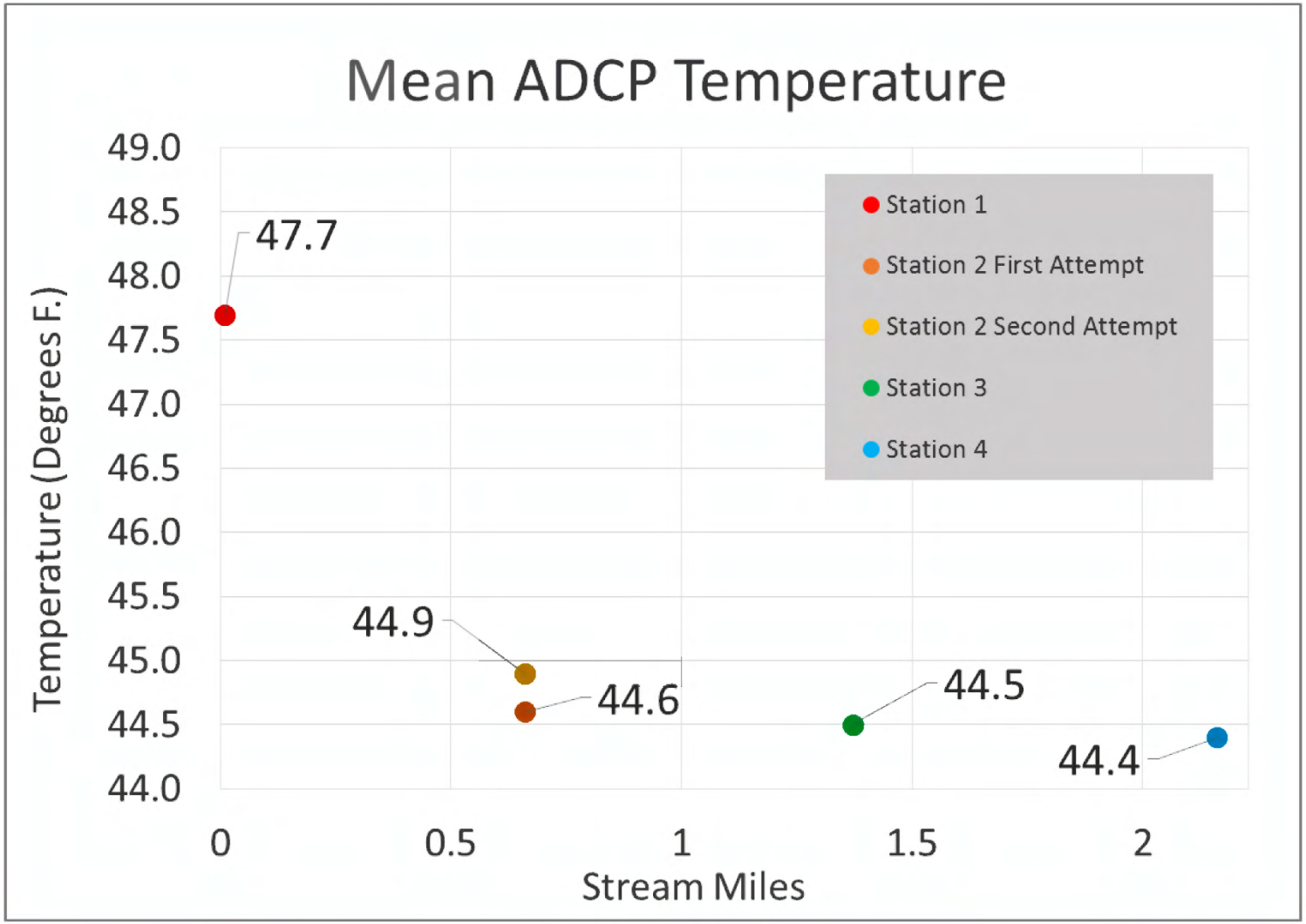
Divide the distance from the respective station to the USGS gage by the average water velocity ($length \div \left(\frac{length}{time}\right) = time$)

Add or subtract the travel time to the time of the measurement

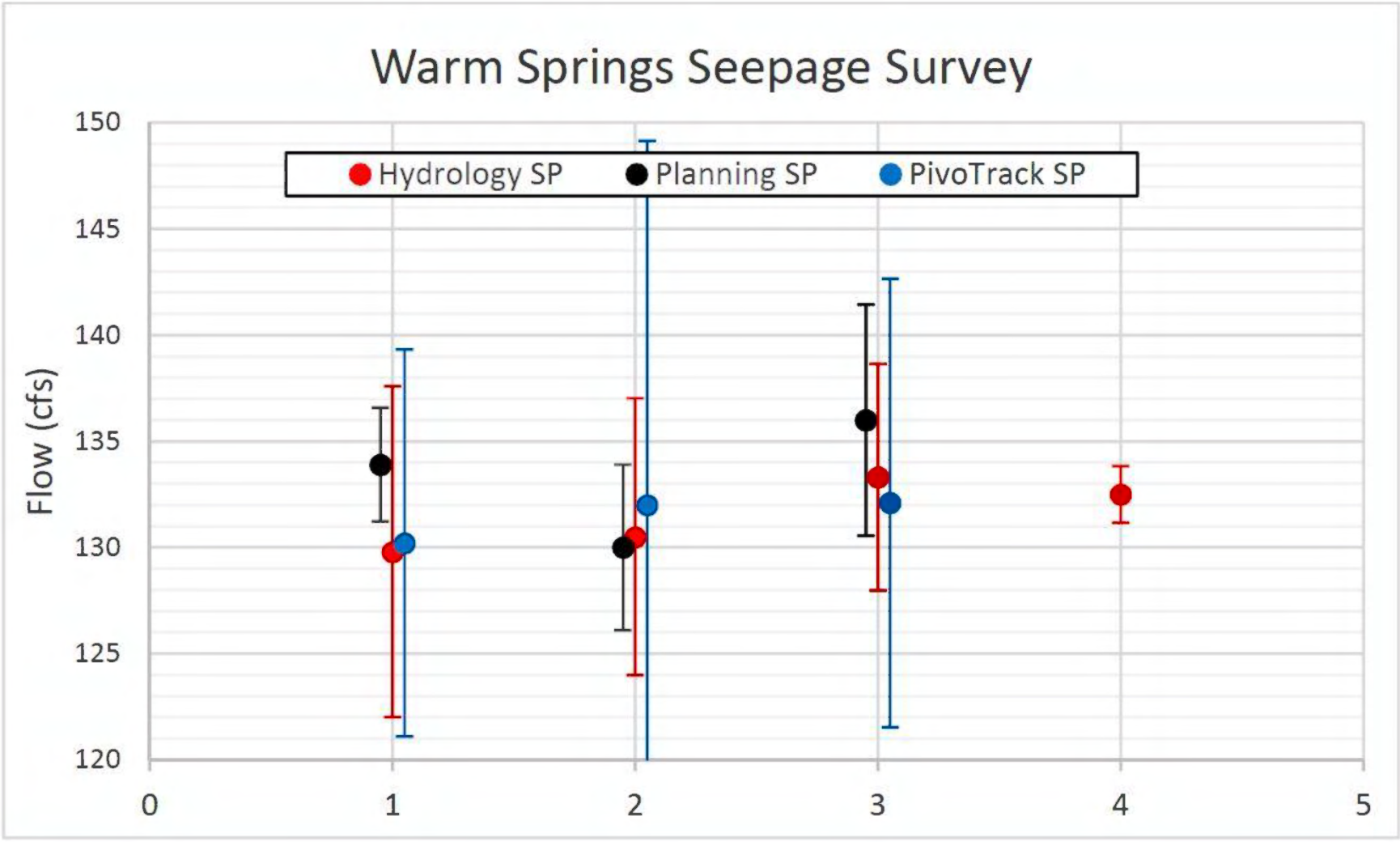
Temporal Component



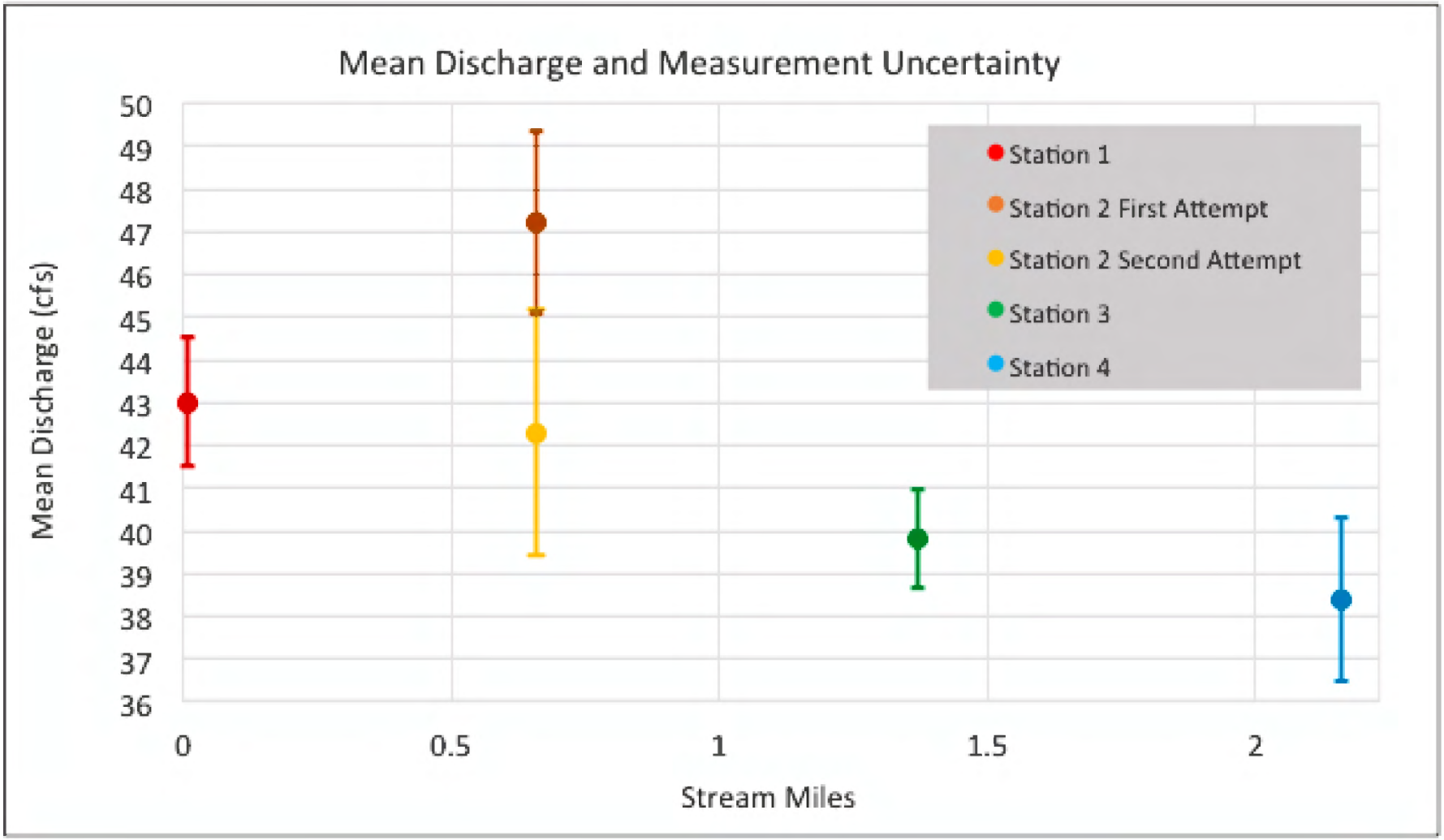
Temperature



July 2017 Results



November 2018 Results



Conclusions

- Potential fluxes are similar in magnitude to measurement uncertainty
- No gains or losses are discernible with high confidence
- Clear impact from thermal water at Station 1
- USGS gage data is provisional

Future Work

- Reduce measurement uncertainty, 12+ transect passes, more exposure time (<5% uncertainty target)
- Research geothermal water use and infrastructure specifics, stream diversions
- Walk stream length to visually assess inputs and outputs
- Consider establishing a 5th measurement location in Reach 1

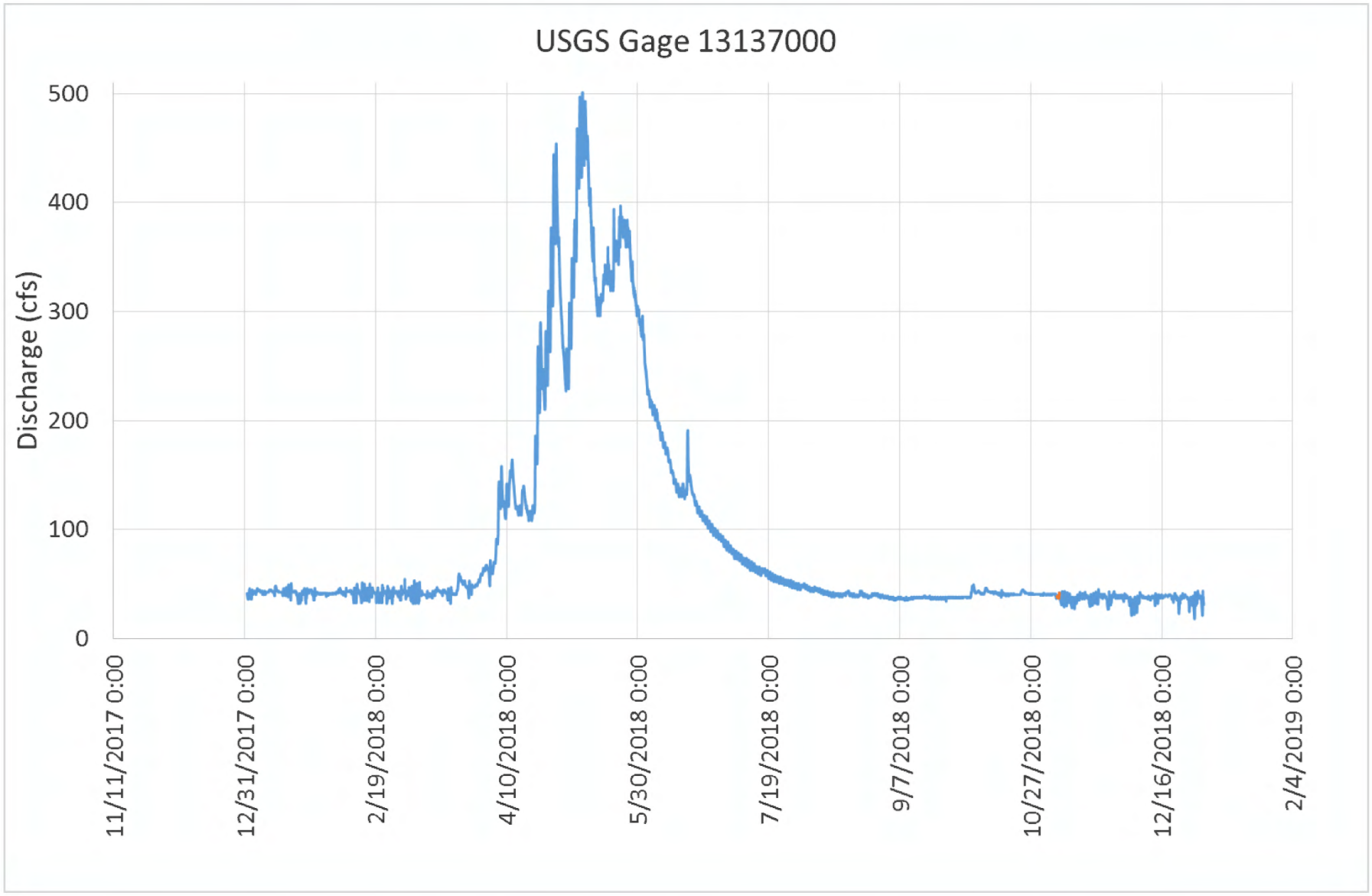
Questions, Comments?

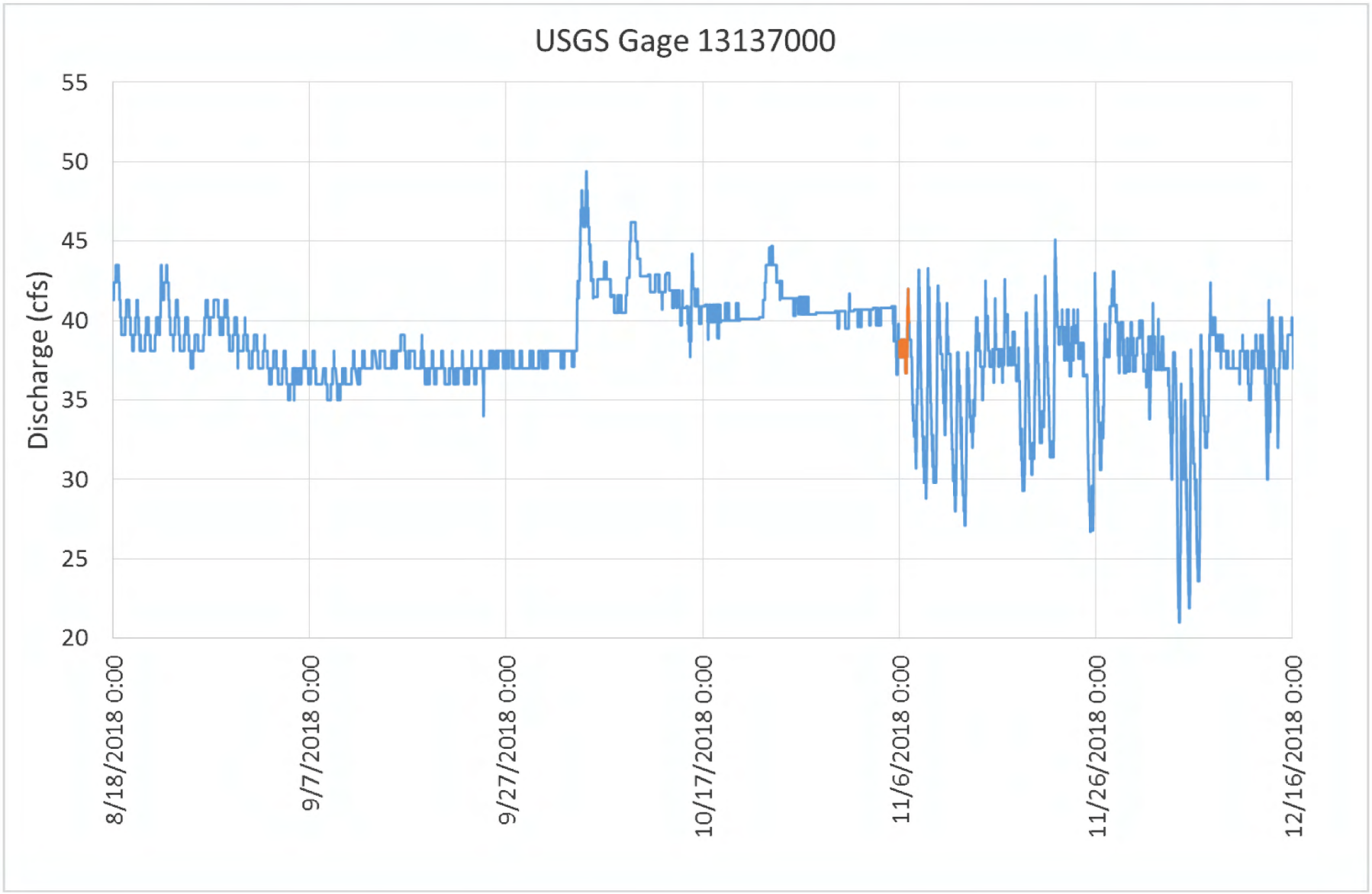
Statistics and Uncertainties

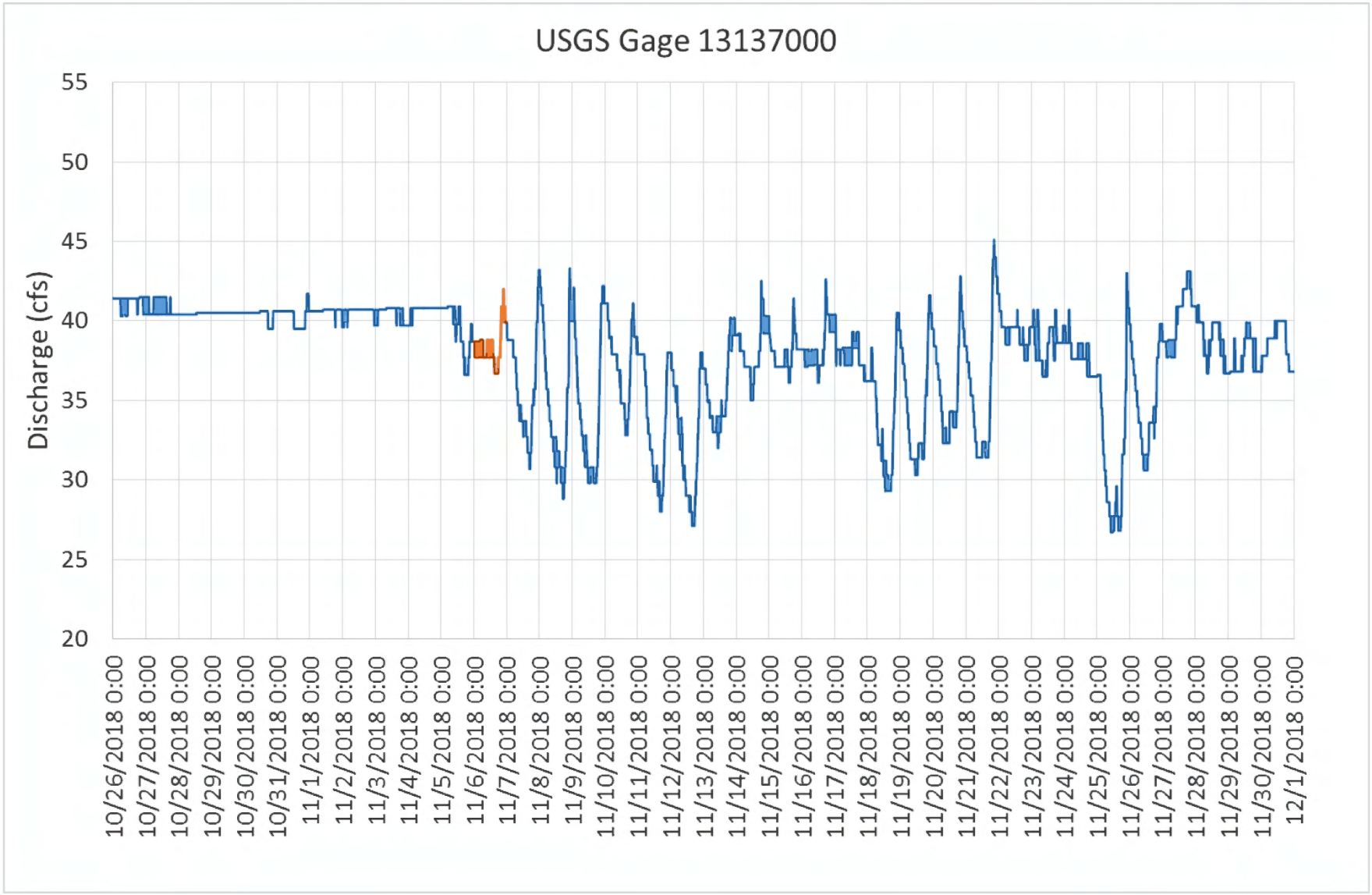
Location	Mean Discharge (feet^3/second)	Standard Deviation (feet^3/second)	Coefficient of Variation (%)	Number of Transect Passes	COV Multiplier	Measurement Uncertainty (%)
Station 1	43	1.6	3.7	8	0.8	3.5
Station 2 First Attempt	47.2	2.7	5.7	10	0.7	4.5
Station 2 Second Attempt	42.3	3.3	7.8	8	0.8	6.8
Station 3	39.8	1.2	3.0	8	0.8	2.9
Station 4	38.4	2.2	5.6	9	0.8	5.0

Travel Time Adjustments

Location	Stream Mile	Distance to USGS Gage (feet)	Minutes of Travel Time to USGS Gage	Approximate Time of Measurements	Travel Time Adjusted Time
Station 1	0	7234	83	10:45-11:00	12:15-12:30
Station 2 First Attempt	0.66	3749	43	11:45-12:15	12:30-13:00
Station 2 Second Attempt	0.66	3749	44	14:30-14:45	15:15-15:30
Station 3	1.37	0	0	12:45-13:00	12:45-13:00
Station 4	2.16	-4171	-48	13:45-14:00	13:00-13:15


USGS Gage 13137000
Discharge (cfs)
500
400
300
200
100
0
11/11/2017 0:00
12/31/2017 0:00
2/19/2018 0:00
4/10/2018 0:00
5/30/2018 0:00
7/19/2018 0:00
9/7/2018 0:00
10/27/2018 0:00
12/16/2018 0:00
2/4/2019 0:00


USGS Gage 13137000
Discharge (cfs)
55
50
45
40
35
30
25
20
8/18/2018 0:00
9/7/2018 0:00
9/27/2018 0:00
10/17/2018 0:00
11/6/2018 0:00
11/26/2018 0:00
12/16/2018 0:00


USGS Gage 13137000
Discharge (cfs)
55
50
45
40
35
30
25
20
10/26/2018 0:00
10/27/2018 0:00
10/28/2018 0:00
10/29/2018 0:00
10/30/2018 0:00
10/31/2018 0:00
11/1/2018 0:00
11/2/2018 0:00
11/3/2018 0:00
11/4/2018 0:00
11/5/2018 0:00
11/6/2018 0:00
11/7/2018 0:00
11/8/2018 0:00
11/9/2018 0:00
11/10/2018 0:00
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11/20/2018 0:00
11/21/2018 0:00
11/22/2018 0:00
11/23/2018 0:00
11/24/2018 0:00
11/25/2018 0:00
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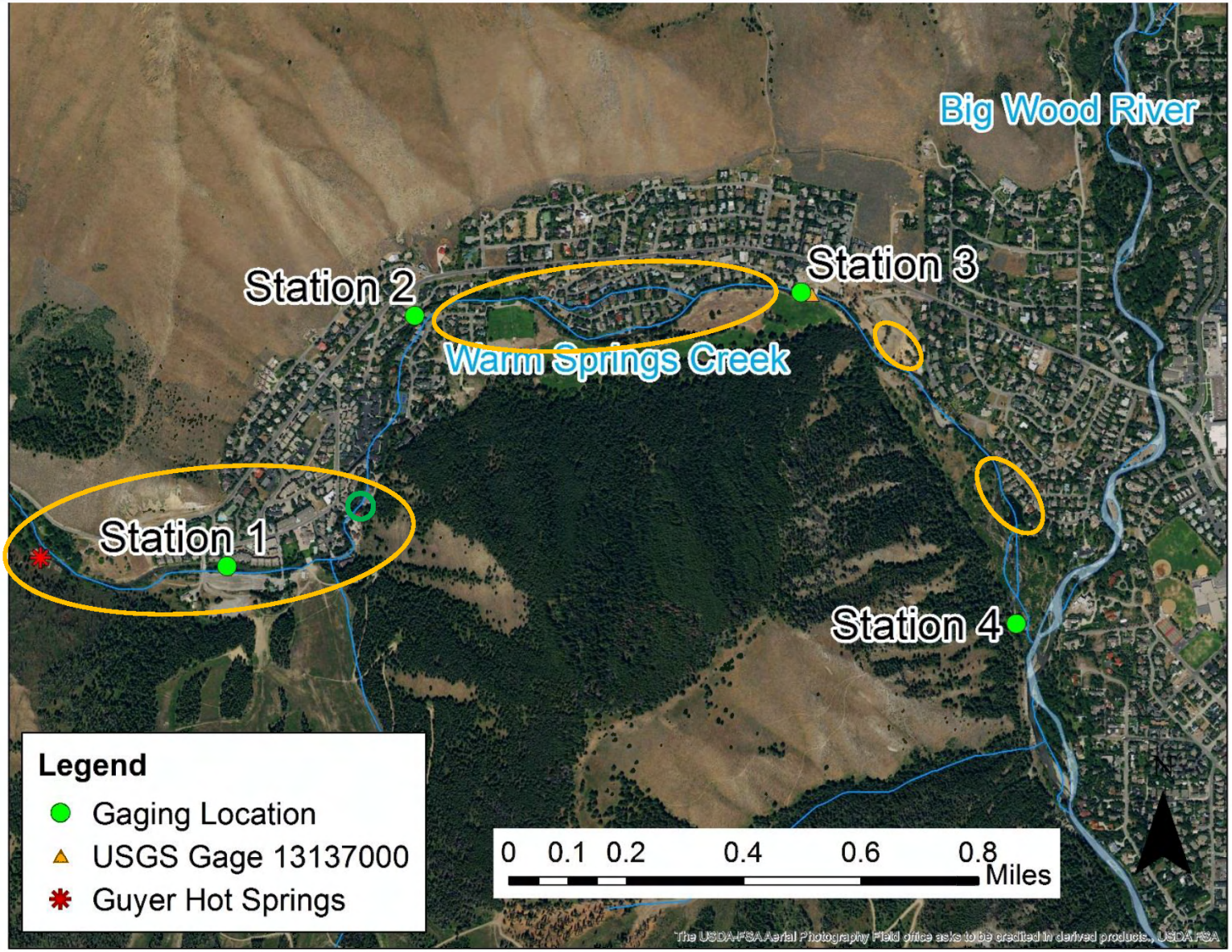
11/30/2018 0:00
12/1/2018 0:00


Big Wood River
Station 2
Station 3
Warm Springs Creek
Station 1
Station 4
Legend
Gaging Location
USGS Gage 13137000
Guyer Hot Springs
0 0.1 0.2 0.4 0.6 0.8
Miles
N
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