

# Interpreting Stream Discharge Variation in the Deshka River Watershed

Mat-Su Salmon Science Symposium 2019

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U.S. Fish and Wildlife Service



# Talk Outline

- Hydrology Goals
- 2019 Low Flows
- Tributary Flow Measurements
- Watershed Characteristics





# Hydrology Goals

1. Flow input for stream temperature model
2. Apply for instream flow water reservations
3. Predict flow from watershed characteristics

$$\text{Flow} = m(\text{drainage area} \times \text{precipitation}) + b$$

***A reservation of water is a water right that leaves water in the river or lake in order to protect specific water uses.***

1966 - Alaska Water Use Act (AS 46.15)

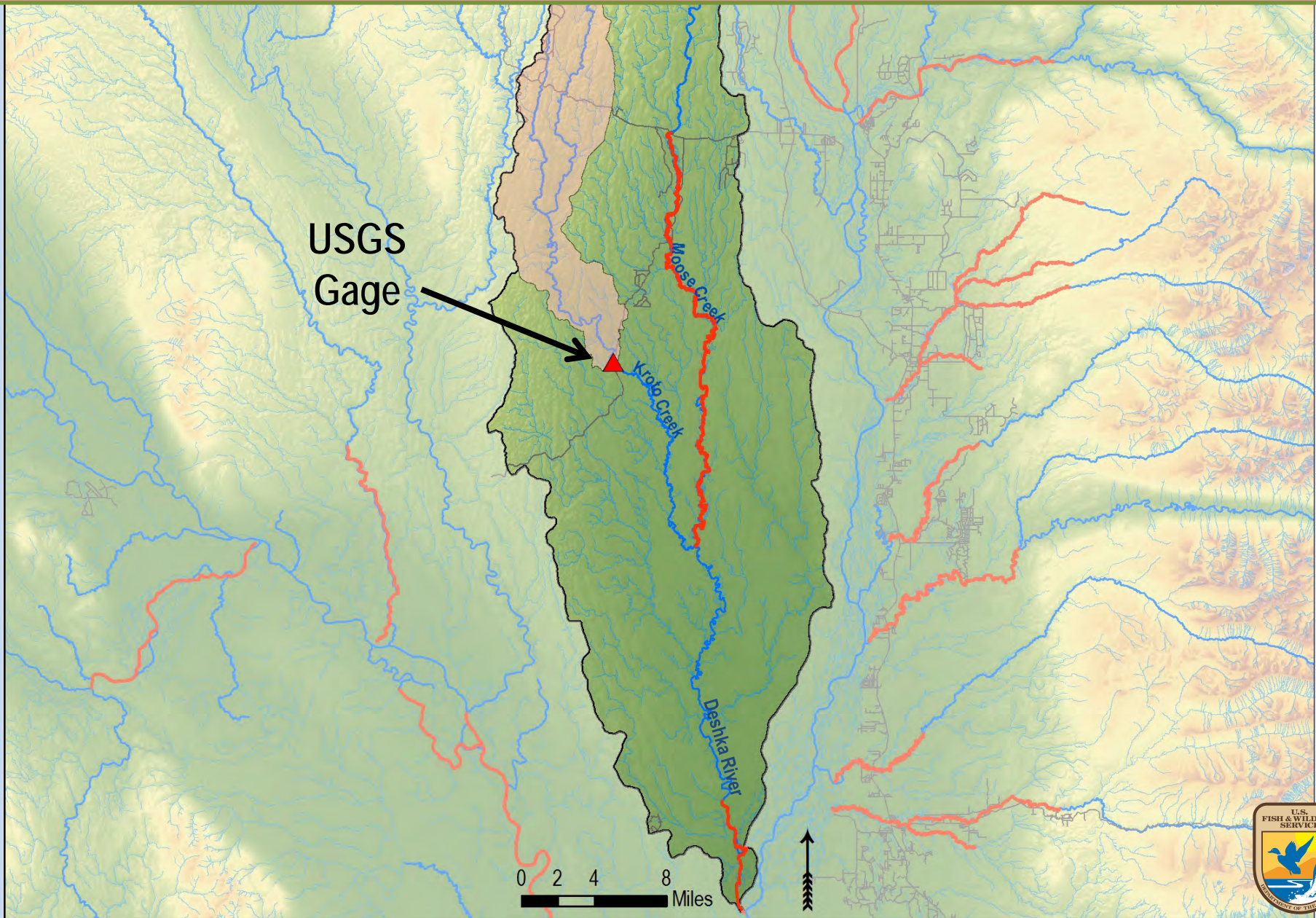
1980 - Reservation of Water Amendment (AS 46.15.145)

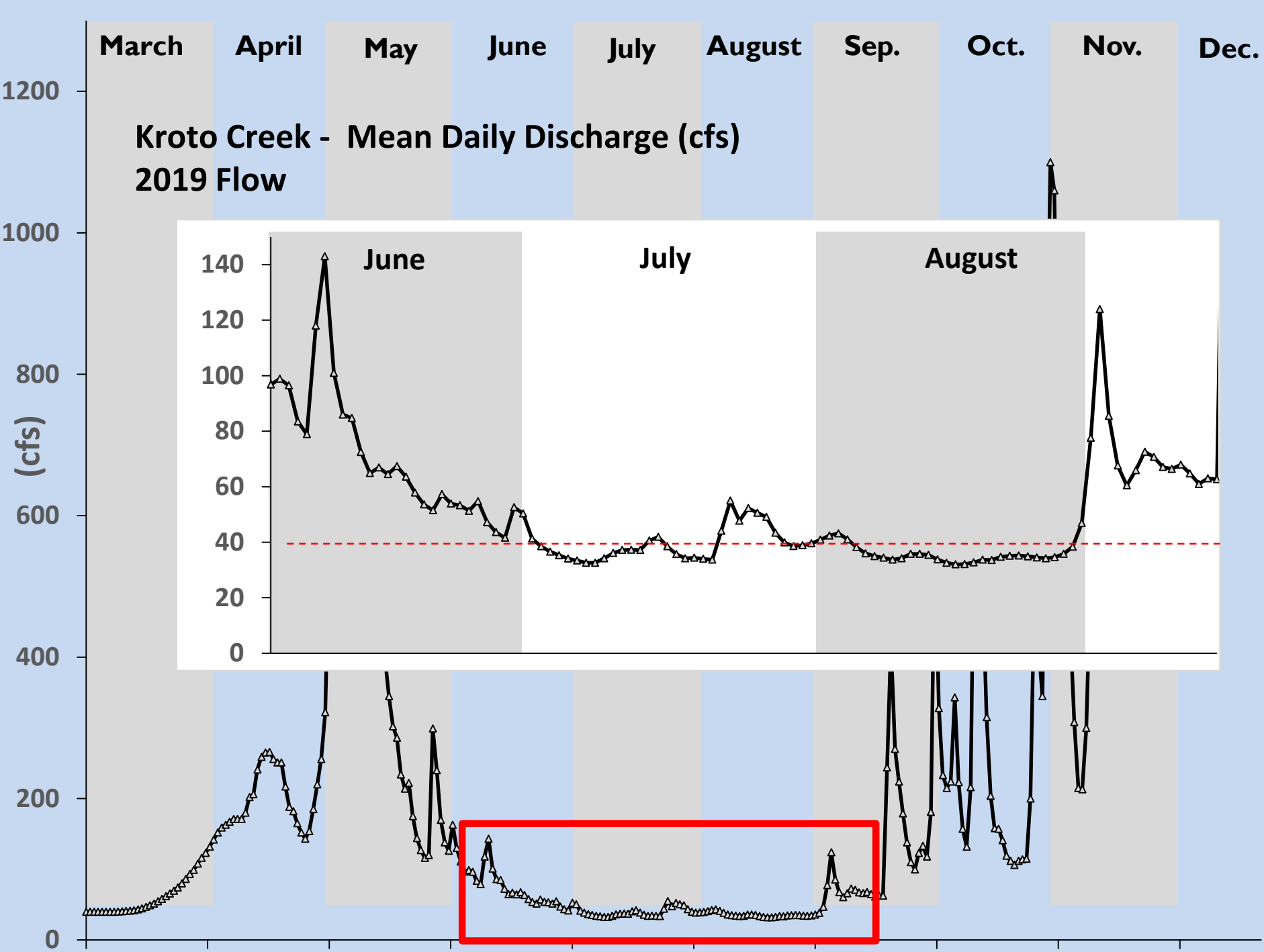
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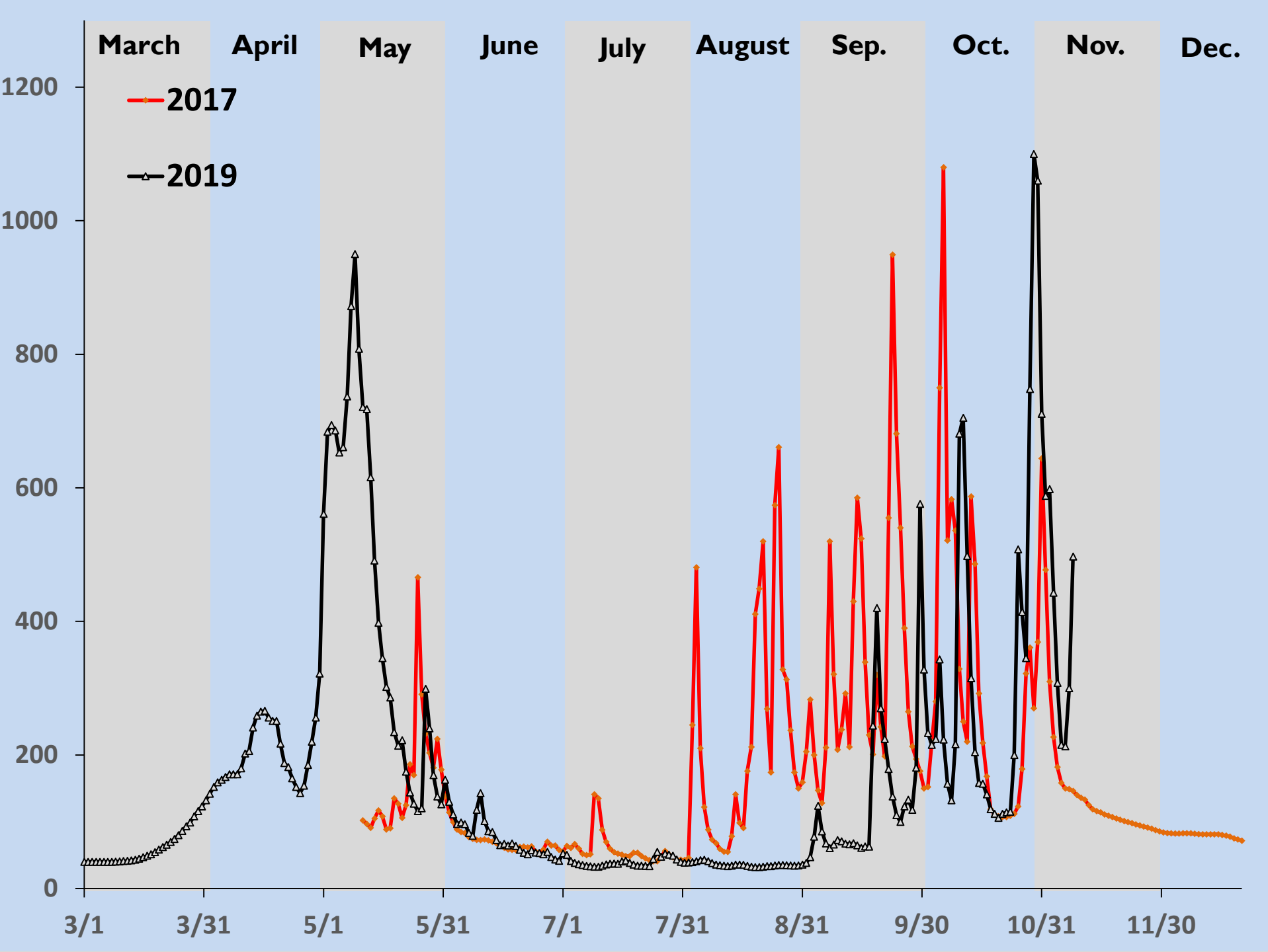
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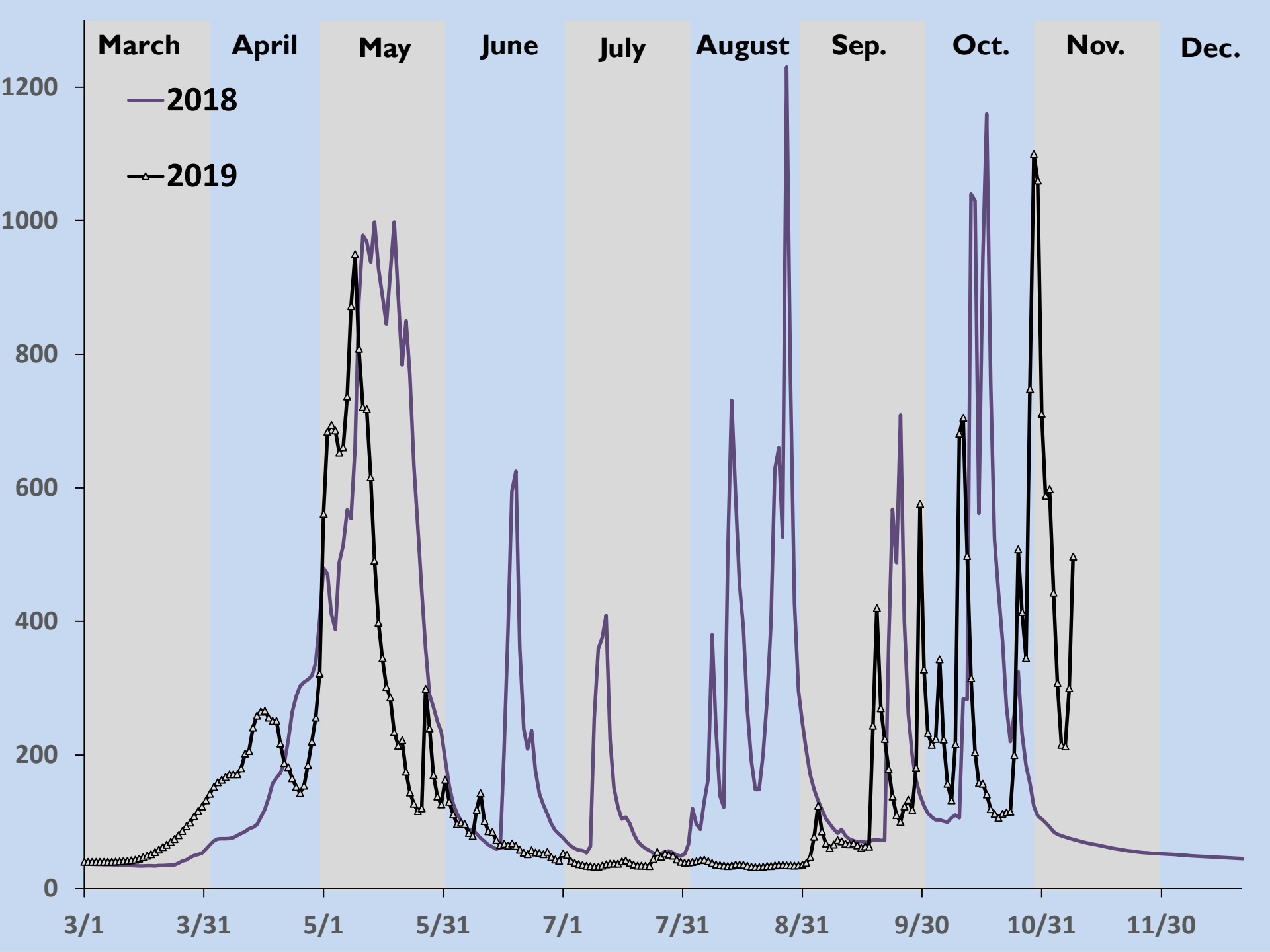


# 2019 Summer Flows





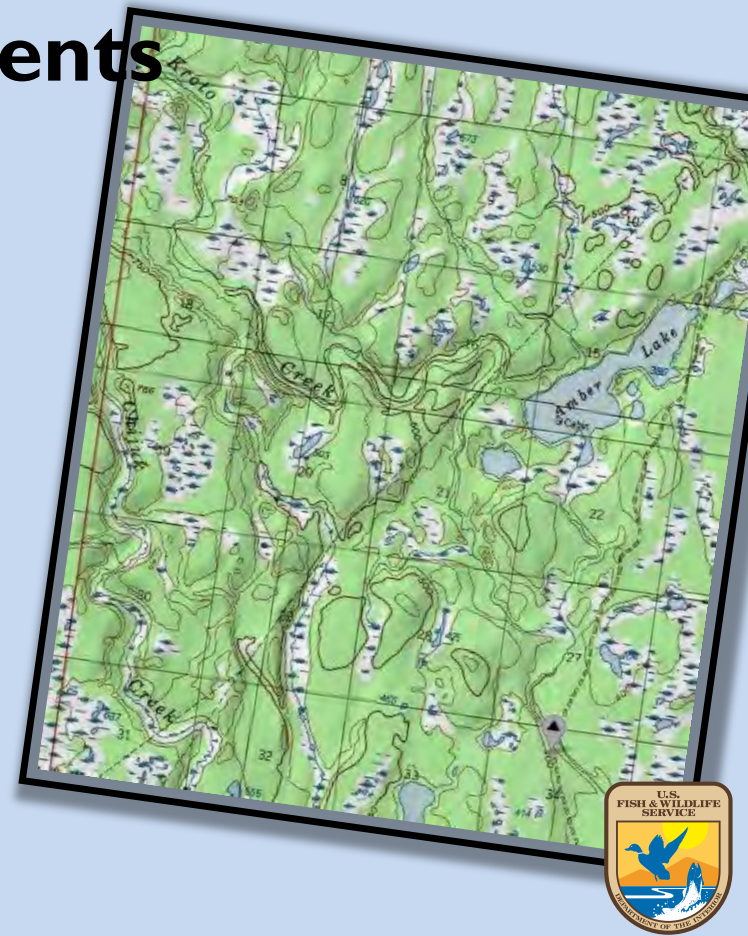






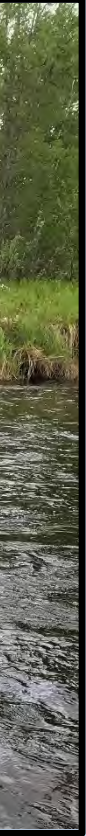
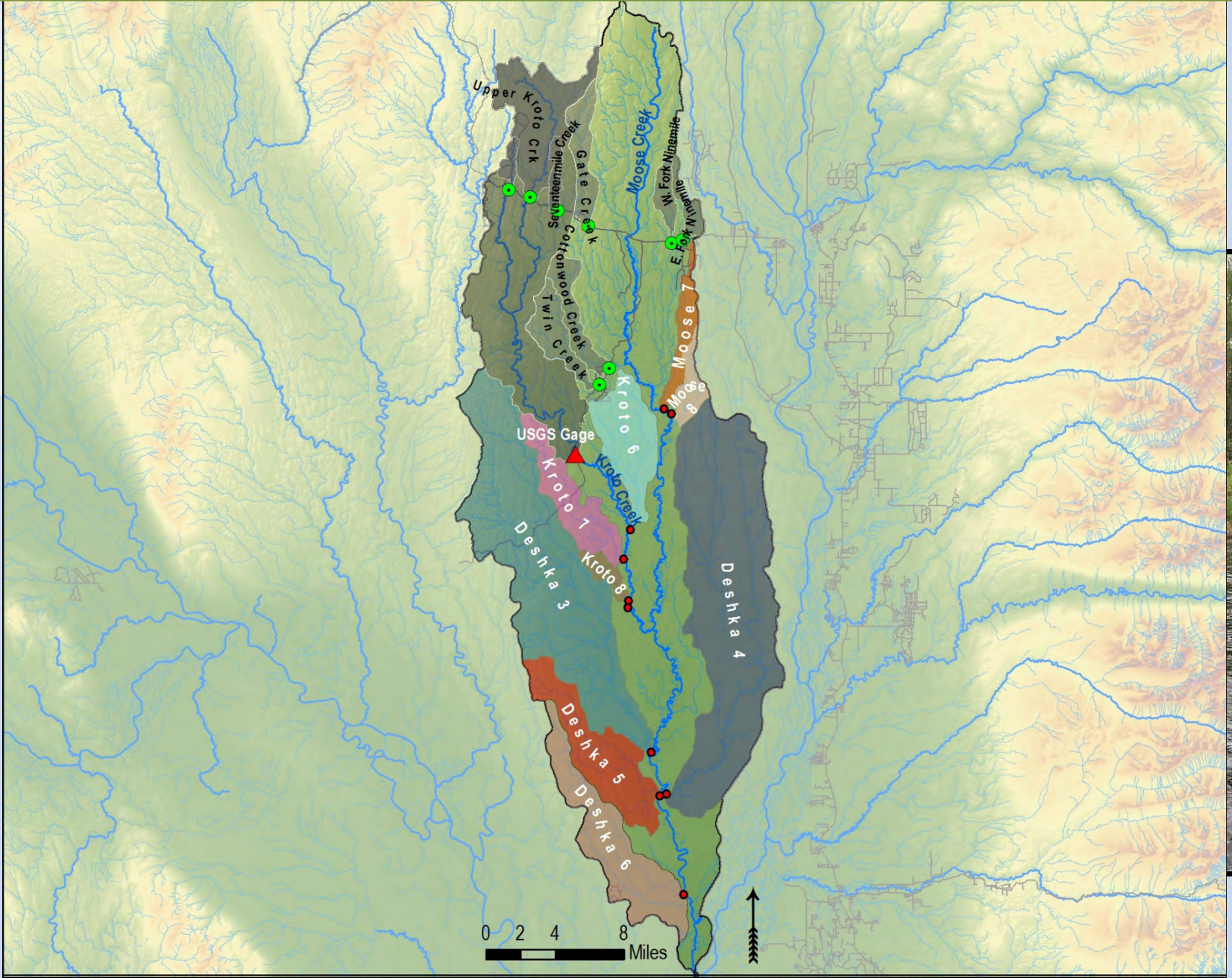
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# Tributary Flow Monitoring Sites

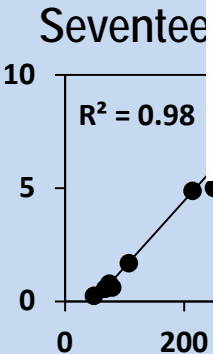
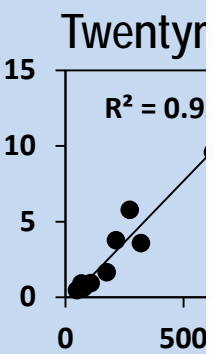
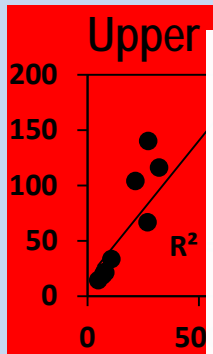
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# Tributary Correlation to the USGS Kroto Creek Gage

- Mean Daily flow, Mean Monthly Flow, Mean Annual
- $R^2$  of 0.8 = Good

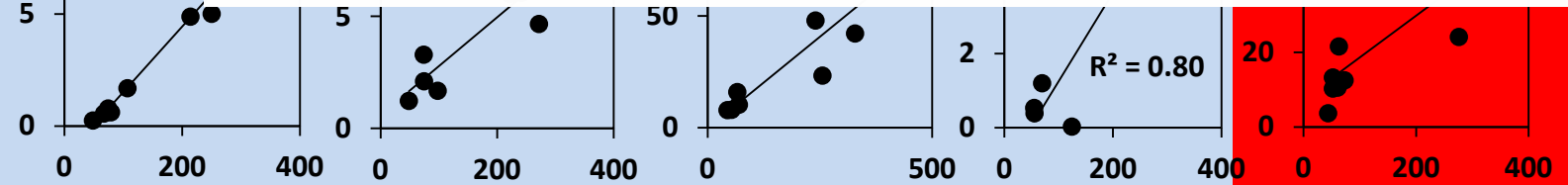
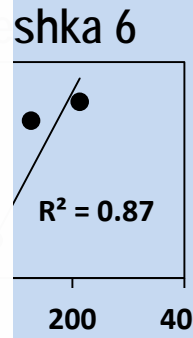
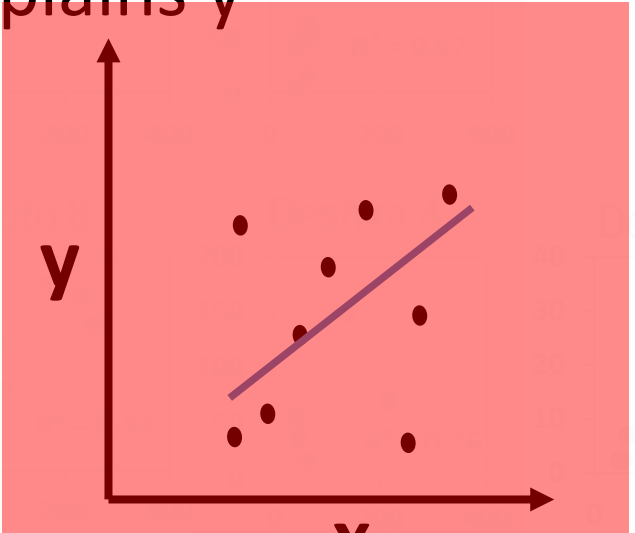
Upper Kroto Gate Creek Cottonwood Kroto 7 Deshka 2



## Linear Regression

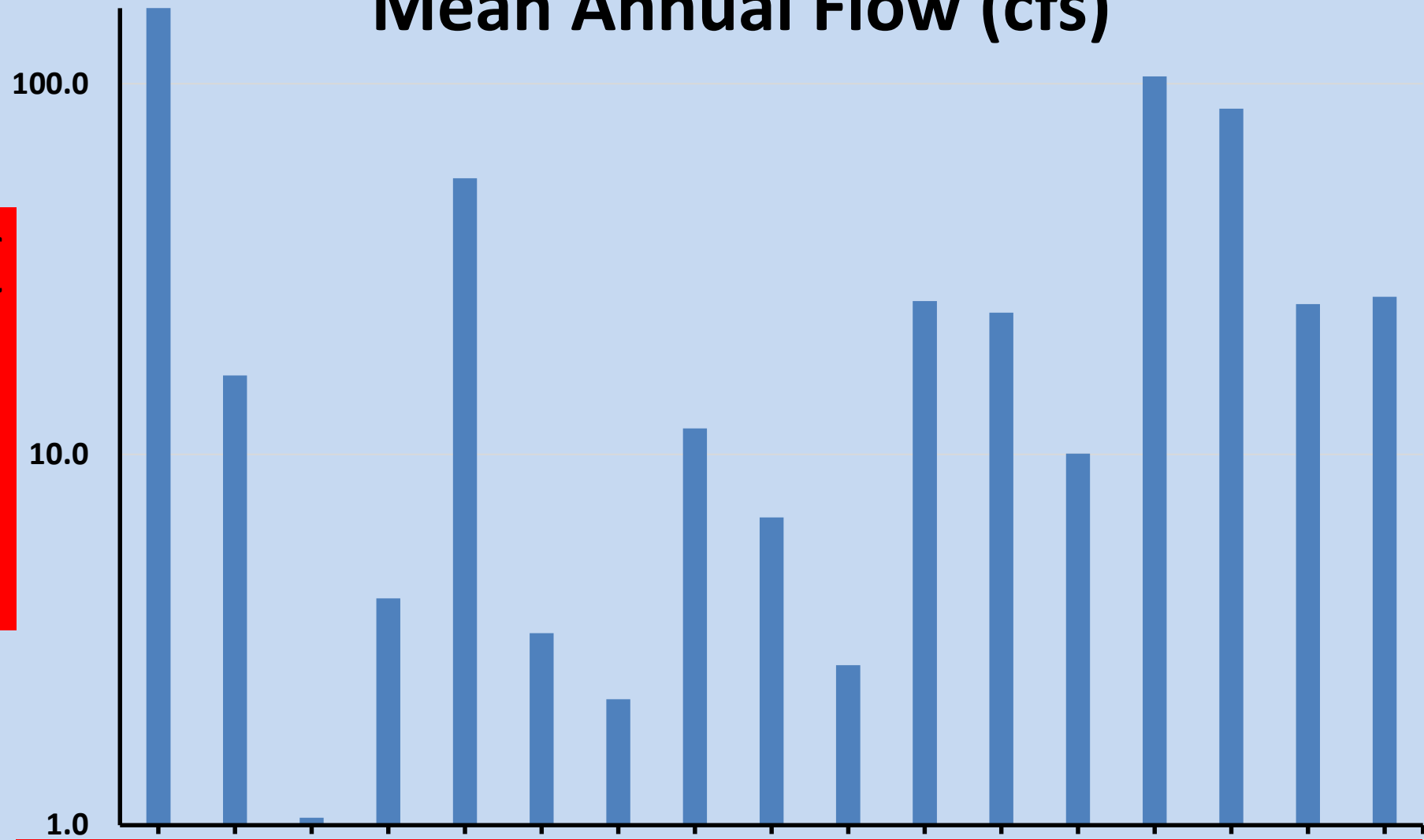
How well x explains y

A central diagram illustrating linear regression. It features a coordinate system with a vertical y-axis and a horizontal x-axis. A blue regression line passes through several black data points. The text "Linear Regression" and "How well x explains y" is positioned above the graph.



# Mean Annual Flow (cfs)

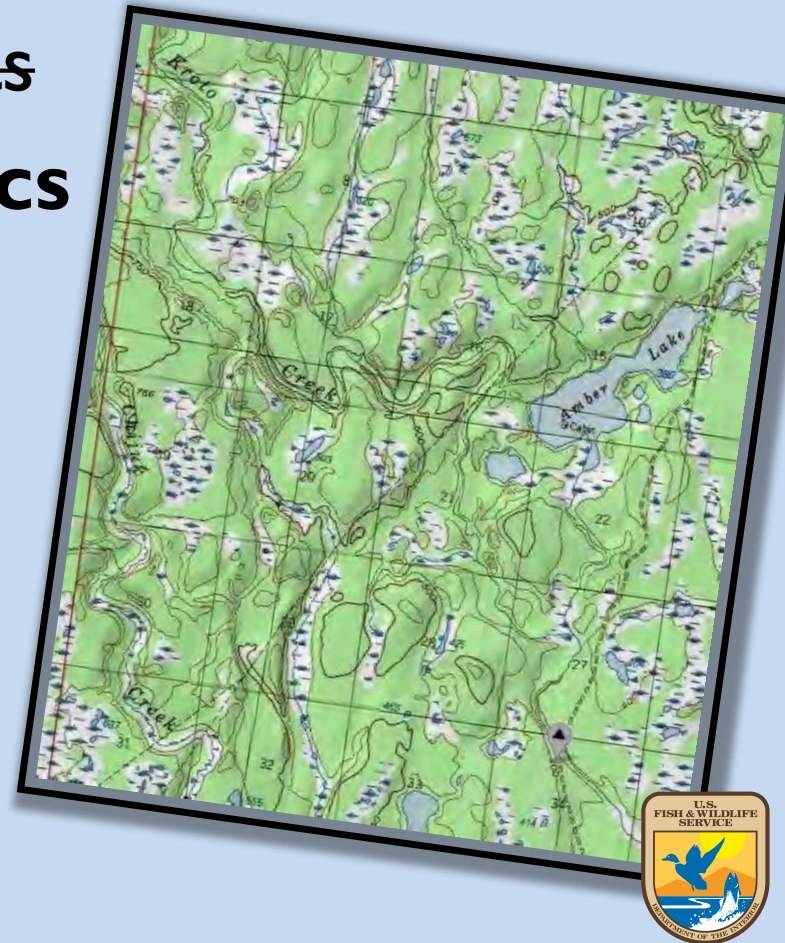
Mean Annual Flow (cfs)



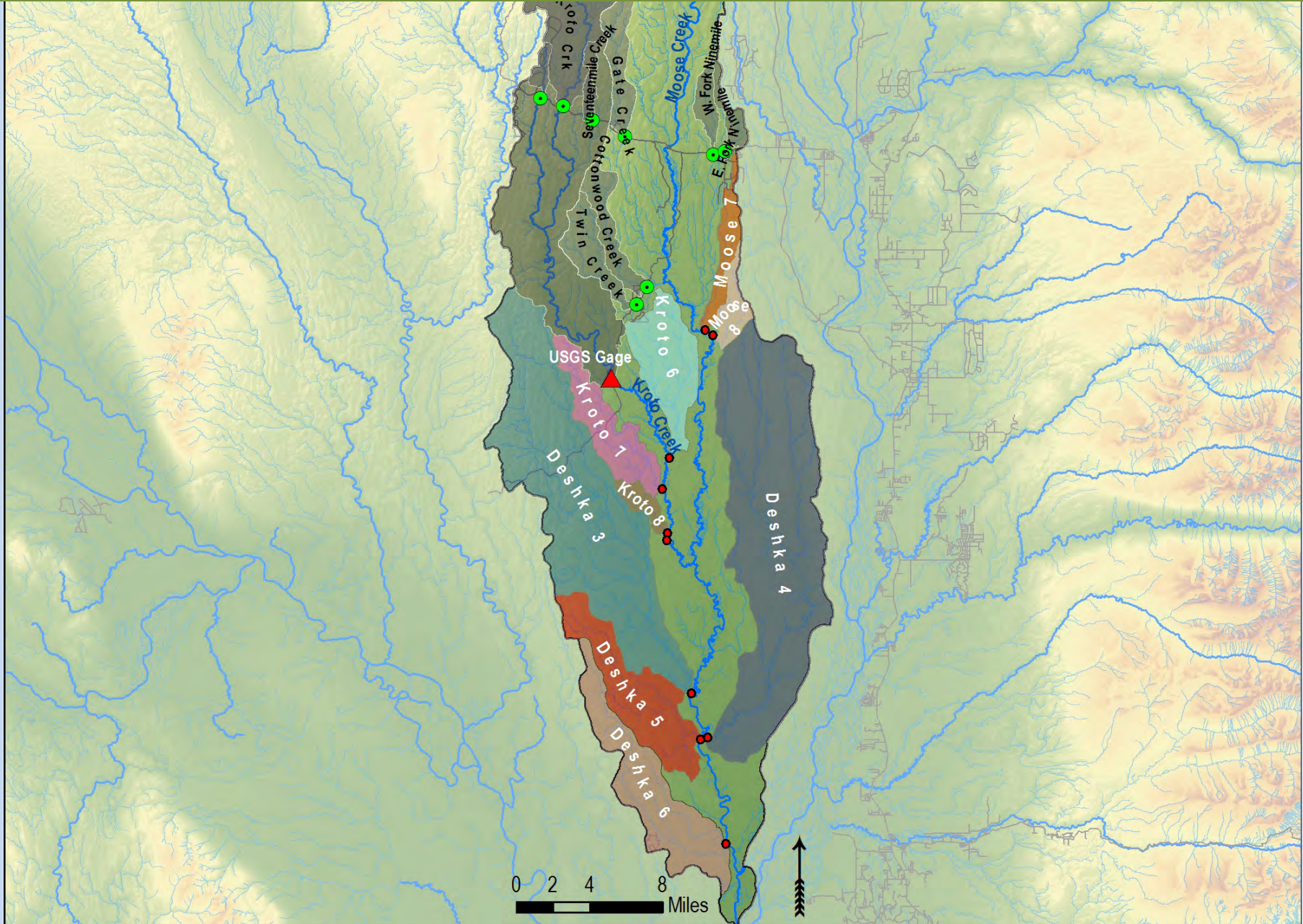
USGS Gage  
Gate  
W. Ninemile  
E. Ninemile  
Upper Kroto  
Seventeenmi...  
Twentymile  
Cottonwood  
Twin  
Moose 7 Trib  
Kroto 6 Trib  
Kroto 7 Trib  
Kroto 8 Trib  
Deshka 3 Trib  
Deshka 4 Trib  
Deshka 5 Trib  
Deshka 6 Trib

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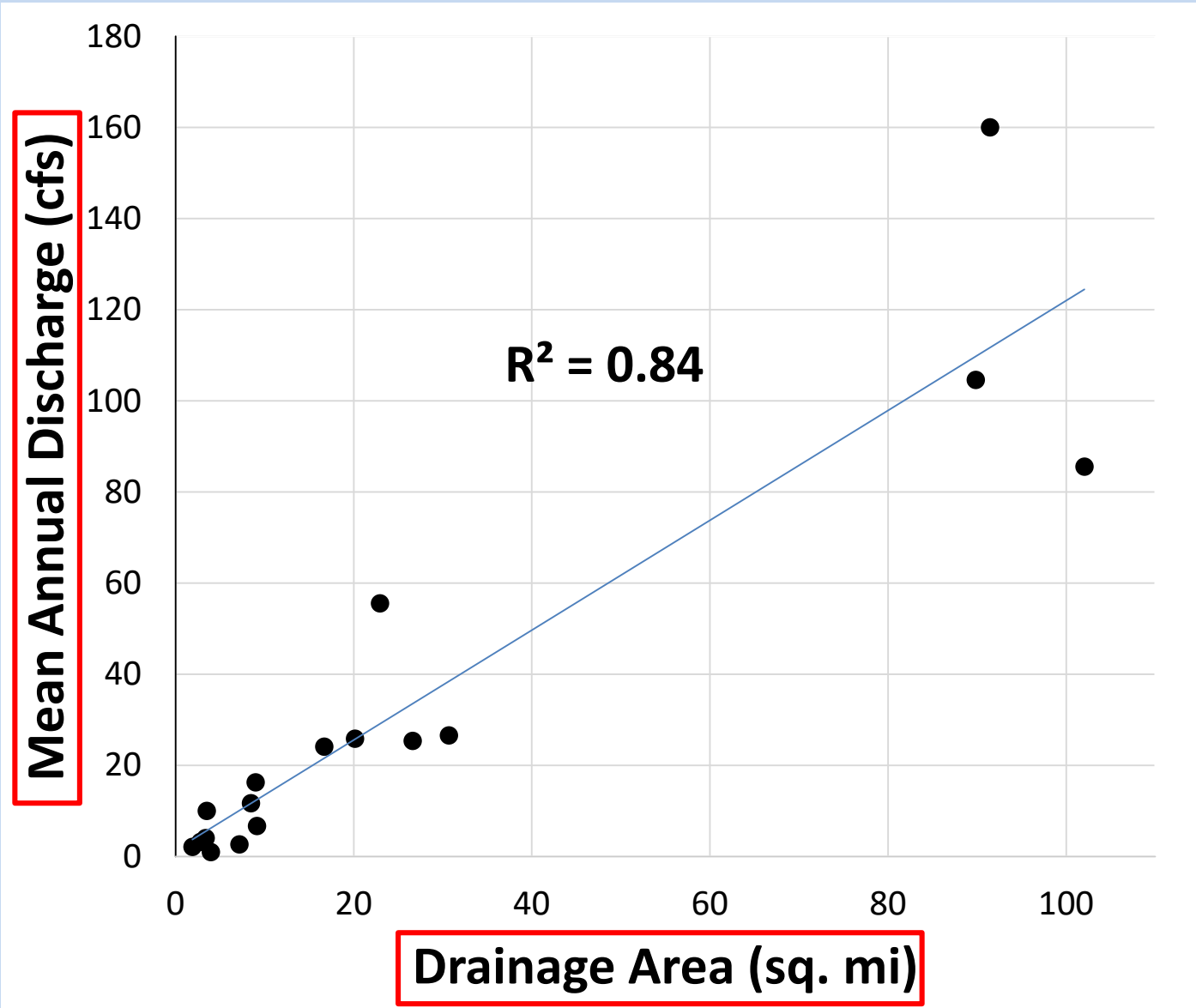
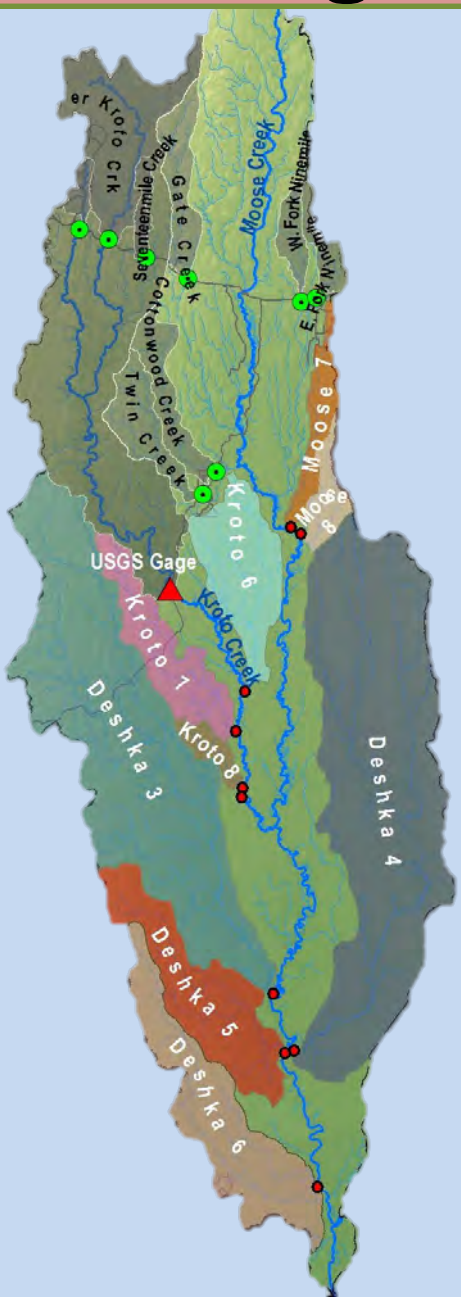
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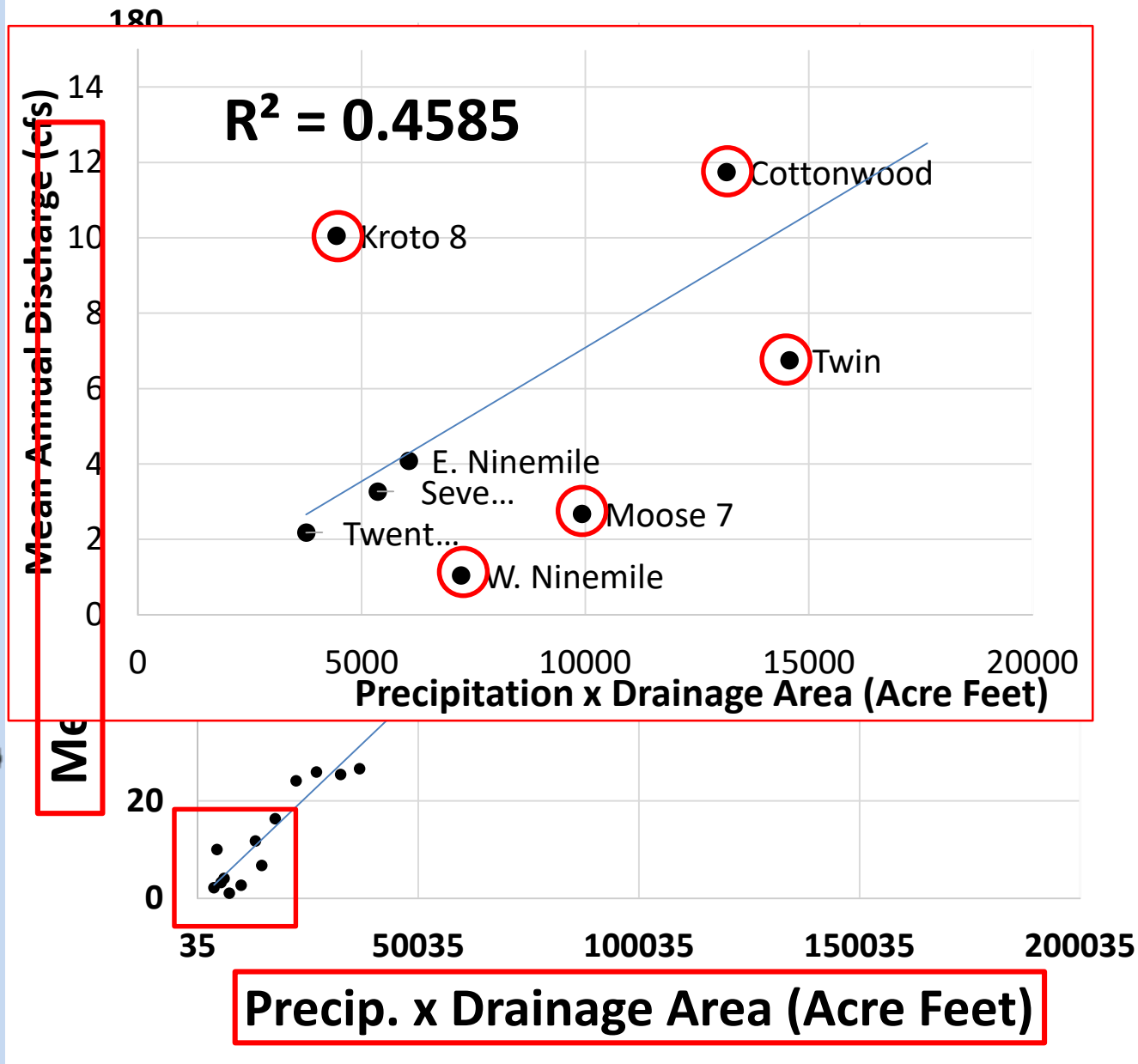
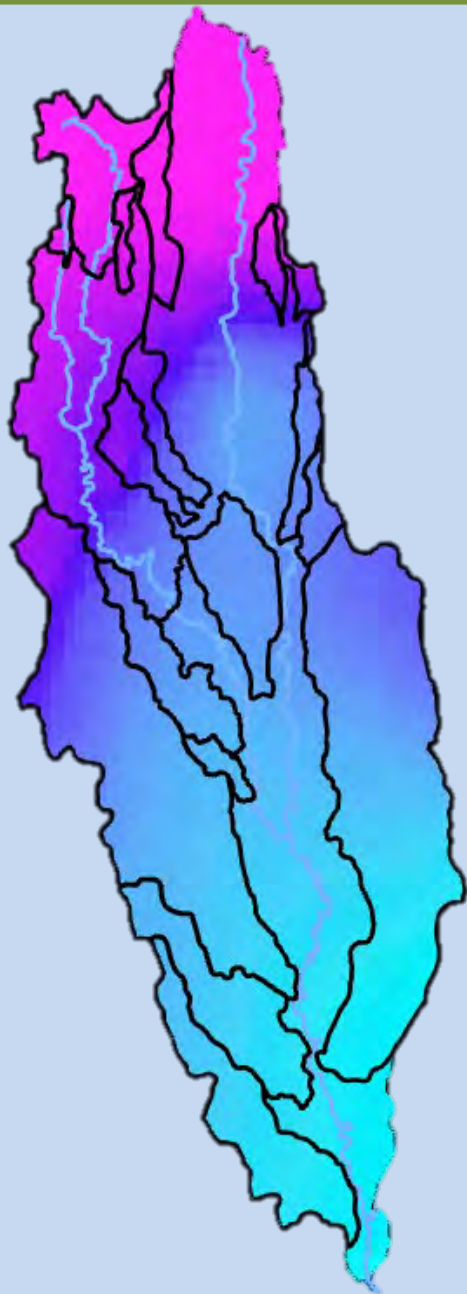
# Drainage Area - Flow Correlation



# Drainage Area – Flow Correlation

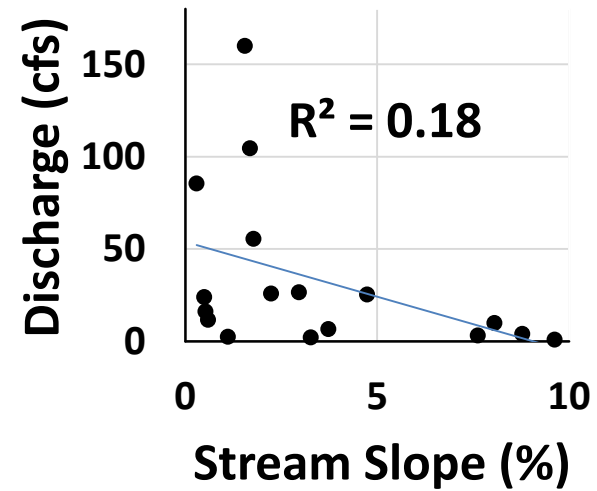
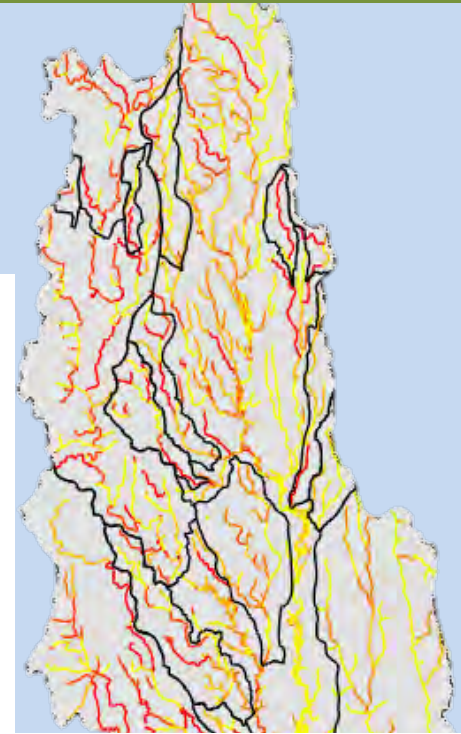
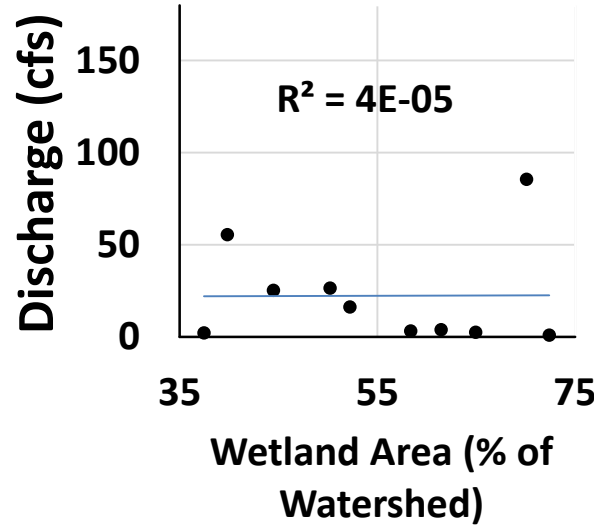
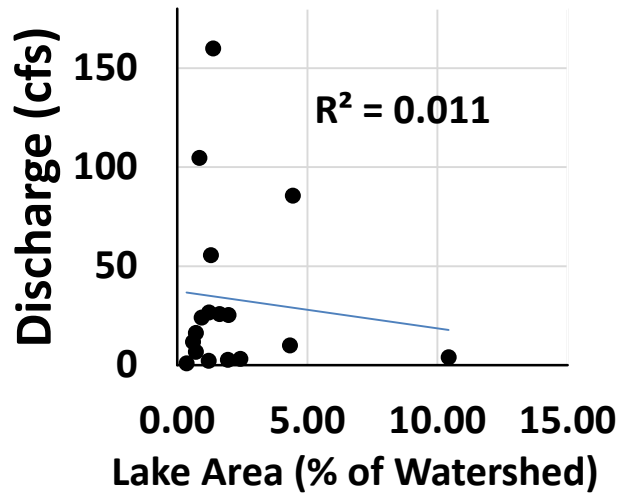


# Precipitation x Area – Flow





# Lake Area? Wetland Area? Stream Slope?



# Next Steps

- Collect discharge for 2 more years
- Multivariate regressions - watershed characteristics
- Temperature and fish correlations with flow
- Investigate different timescales

## Take Away

**Physical watershed characteristics can tell us flow in streams we didn't even gage**

*Questions?*



Photo: MSB 2011



# Maximum Weekly Average Temperature (2017)

