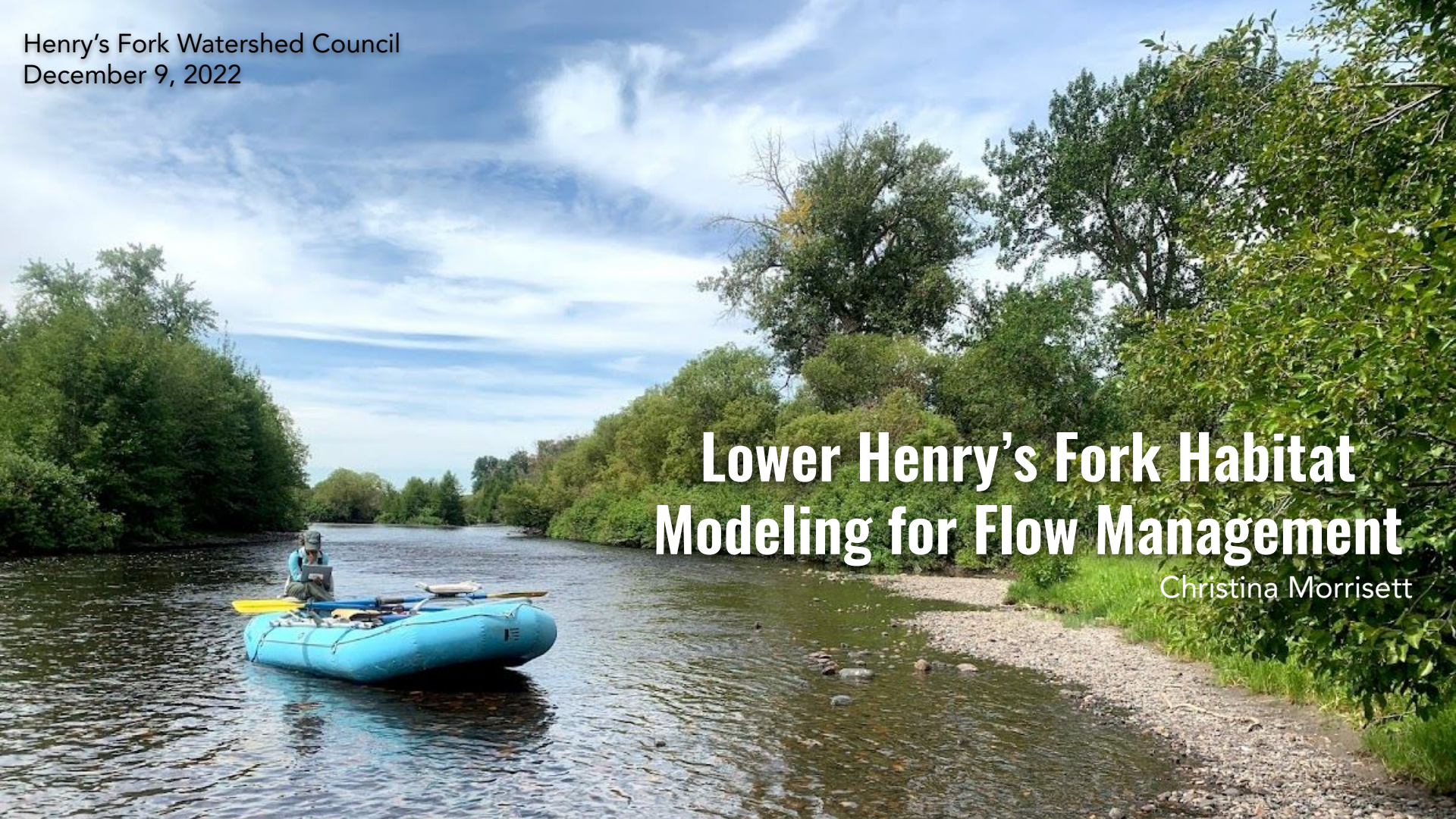
Henry's Fork Watershed Council
December 9, 2022



Lower Henry's Fork Habitat Modeling for Flow Management

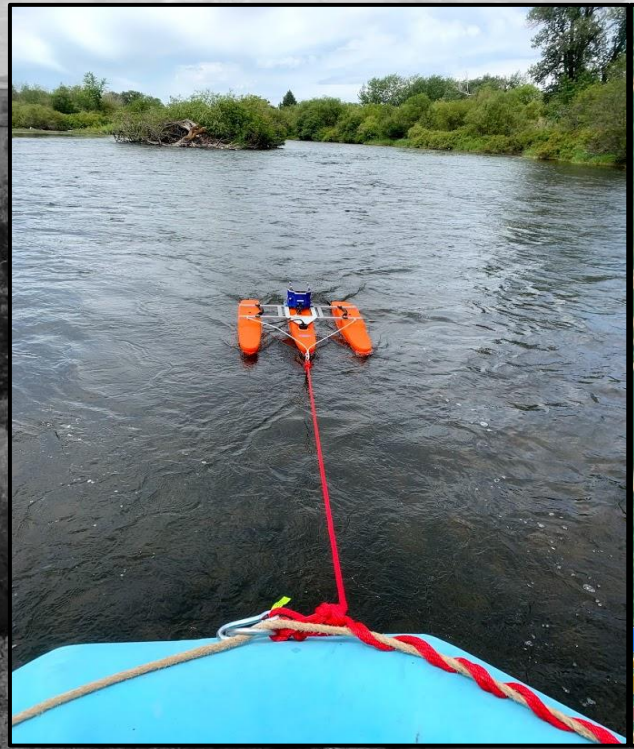
Christina Morrisett

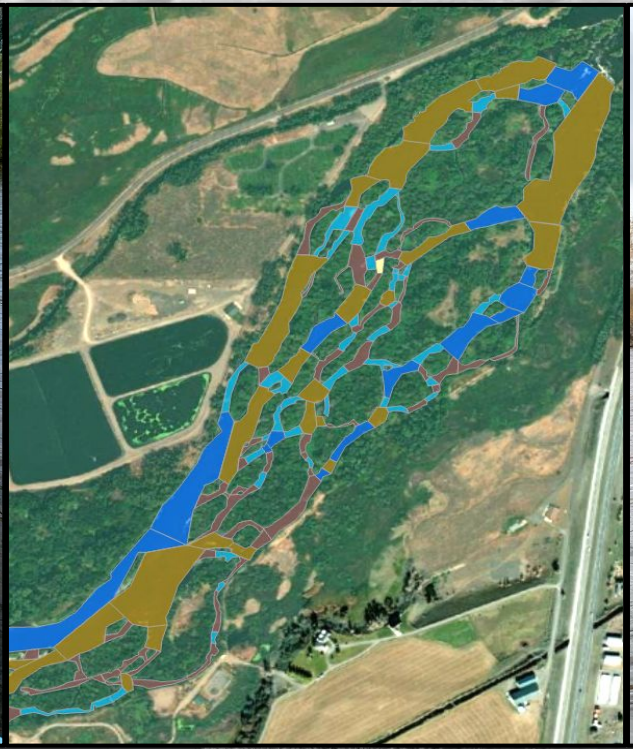
Why does the lower Henry's Fork matter?

Island Park Reservoir Management


What we knew
• 2018: 1000 cfs target at St. Anthony met irrigation demand


Where should the target be?
What should the target be?

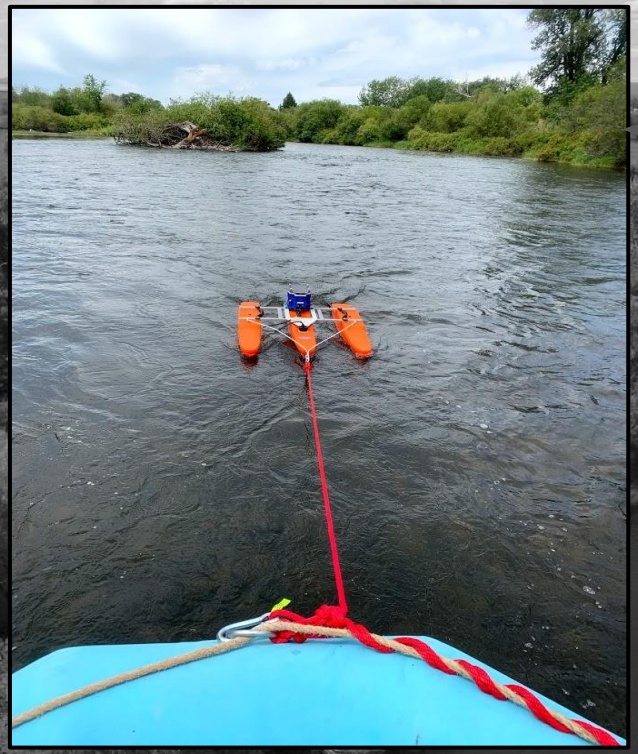




Hydraulic data
Summers 2019-2021

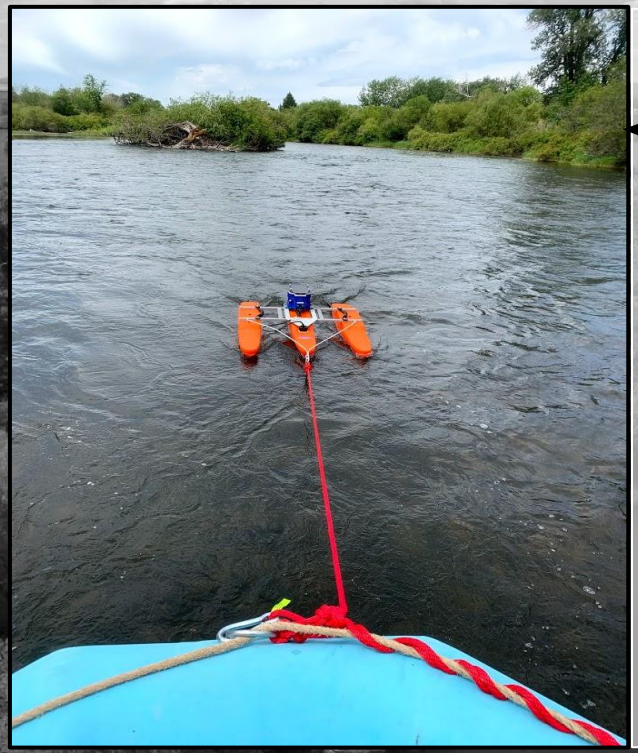
Habitat mapping
Summer 2020

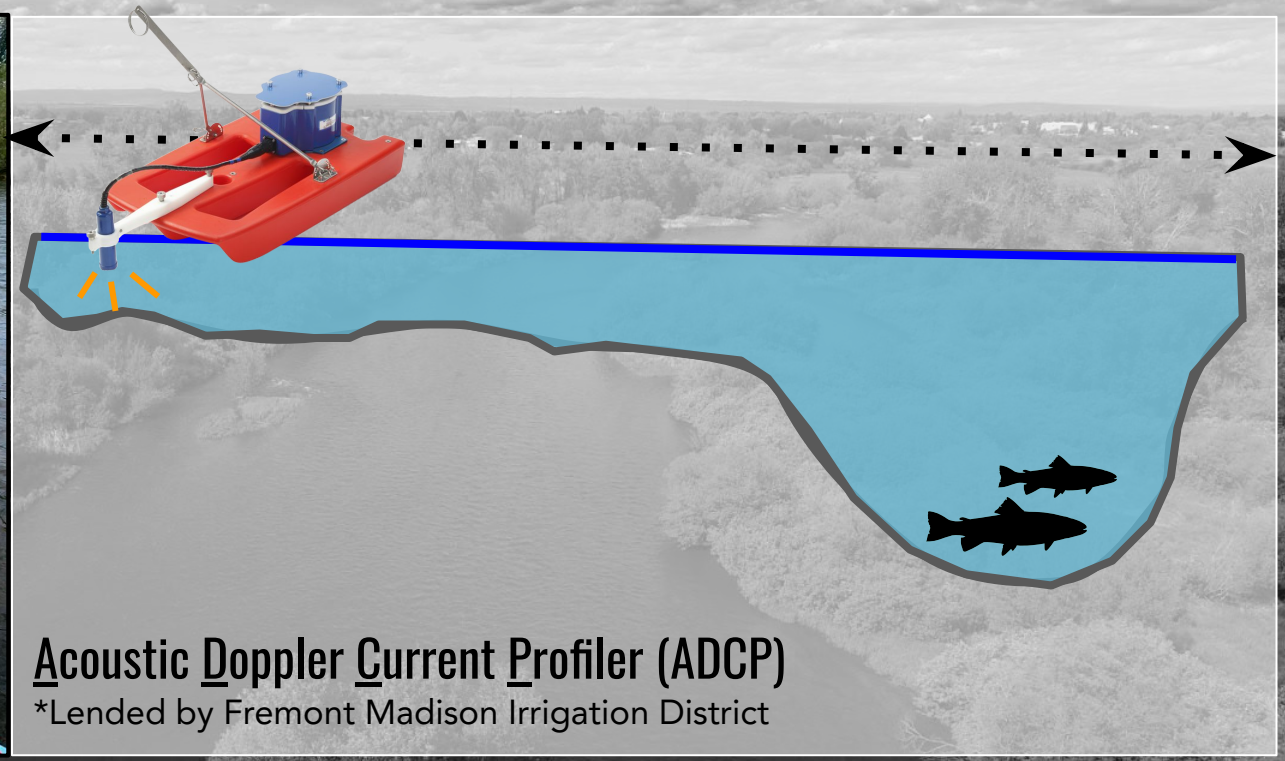
Suitability modeling
Winter 2021-Spring 2022



Hydraulic data

Summers 2019-2021



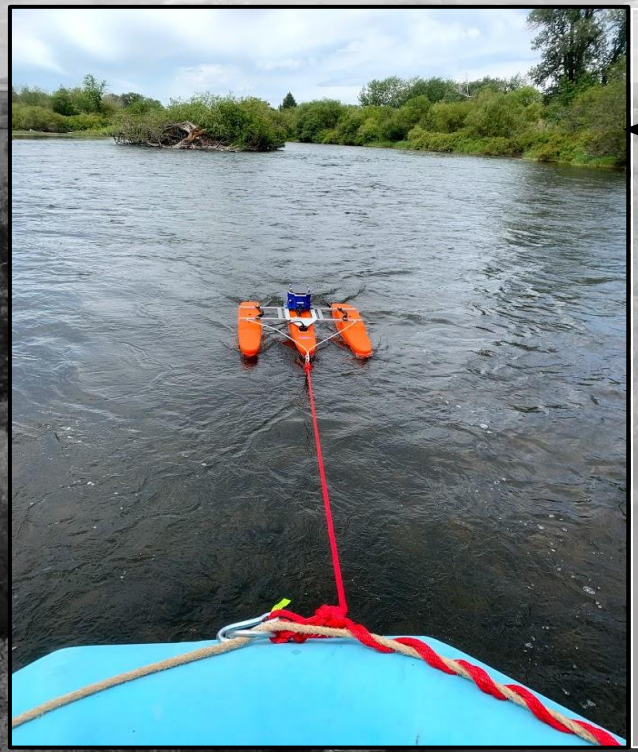


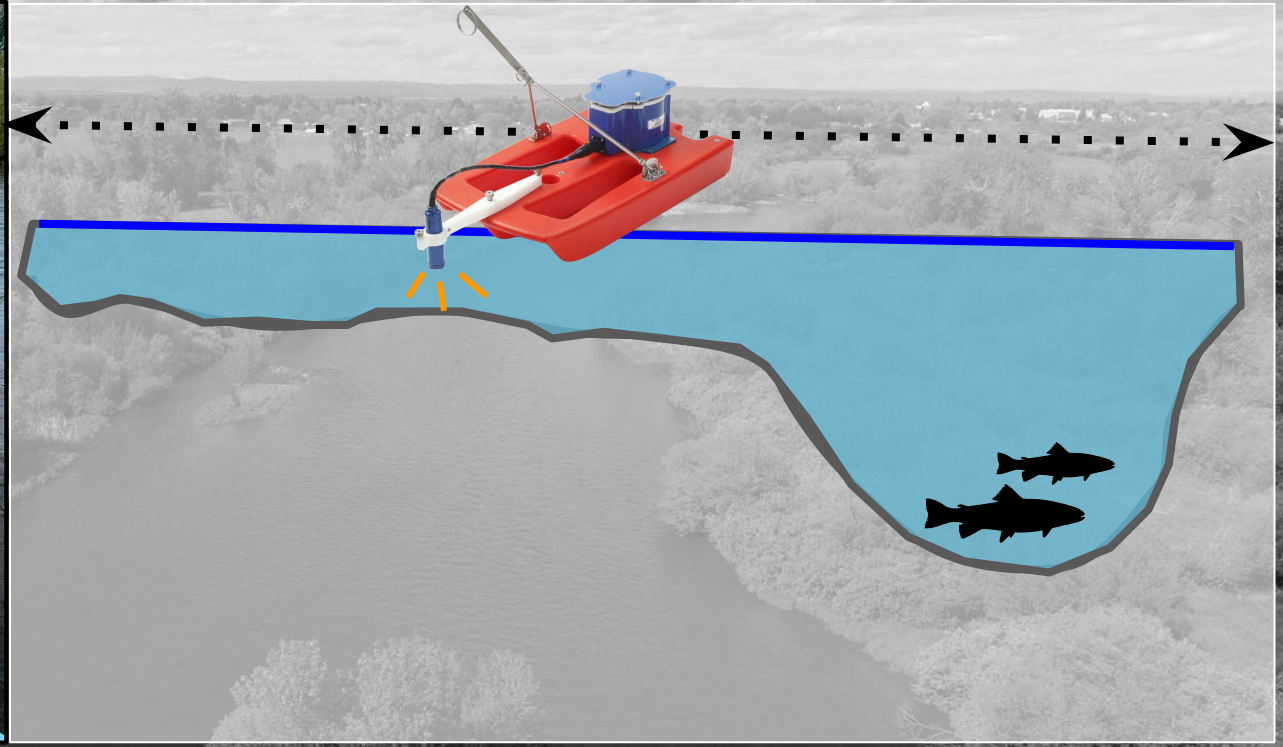
Acoustic Doppler Current Profiler (ADCP)

*Lended by Fremont Madison Irrigation District

Hydraulic data

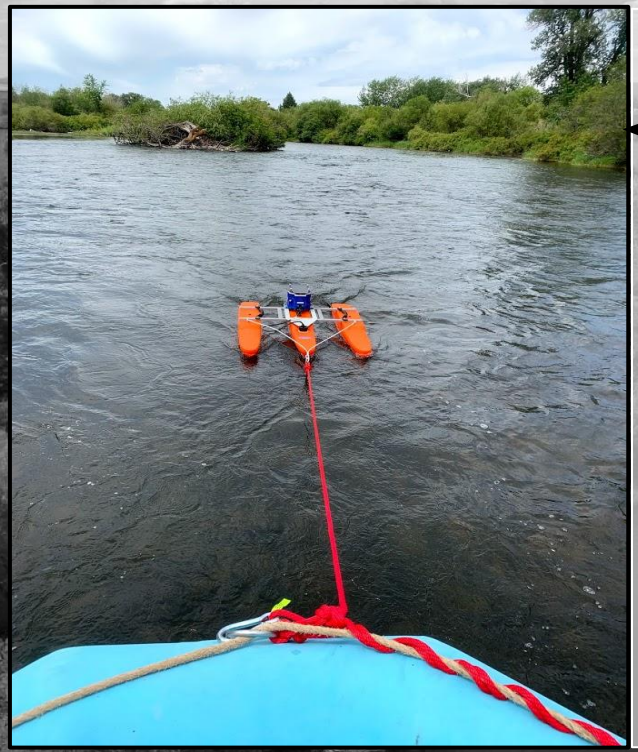
Summers 2019-2021

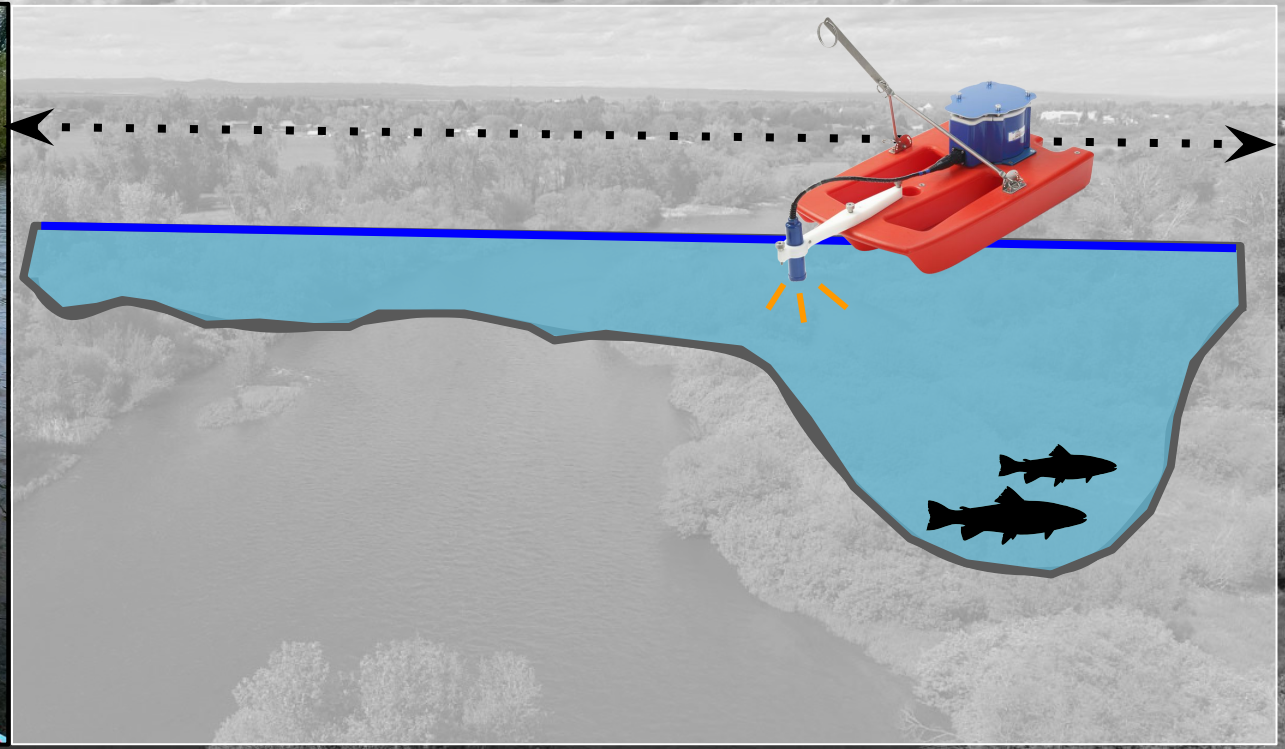




Hydraulic data

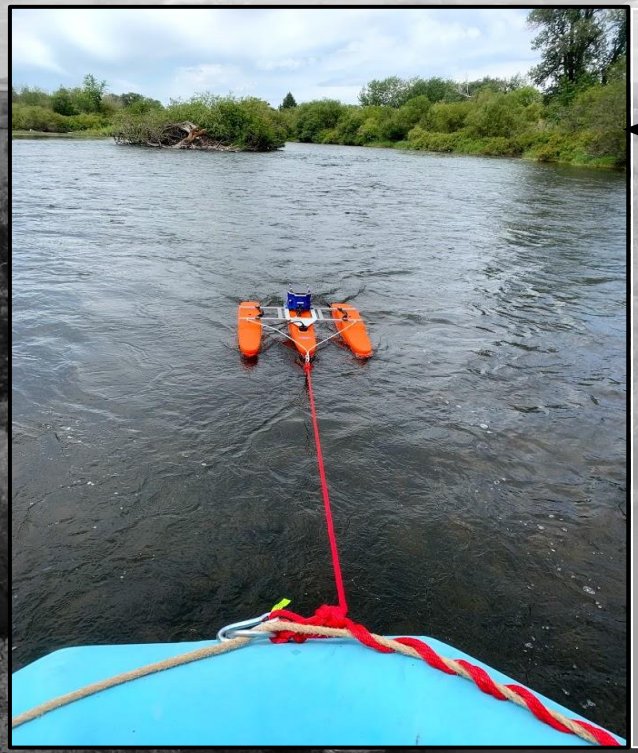
Summers 2019-2021

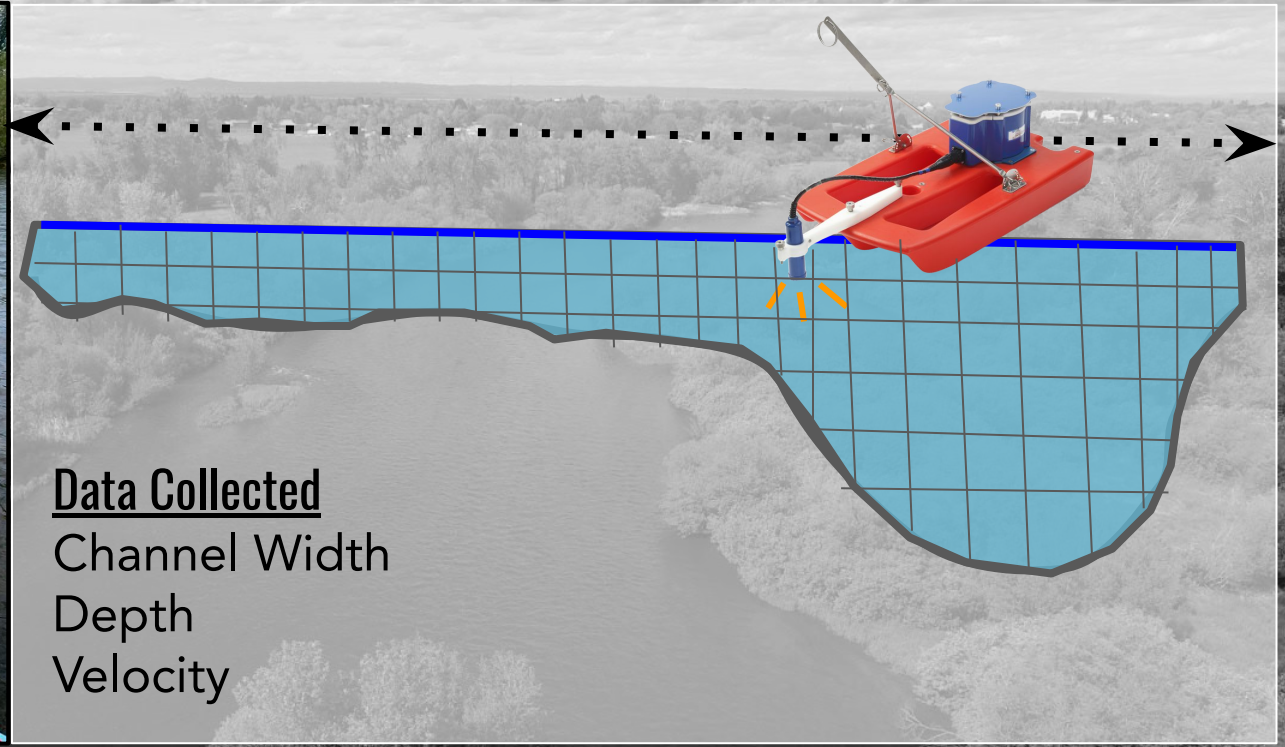




Hydraulic data

Summers 2019-2021





Data Collected

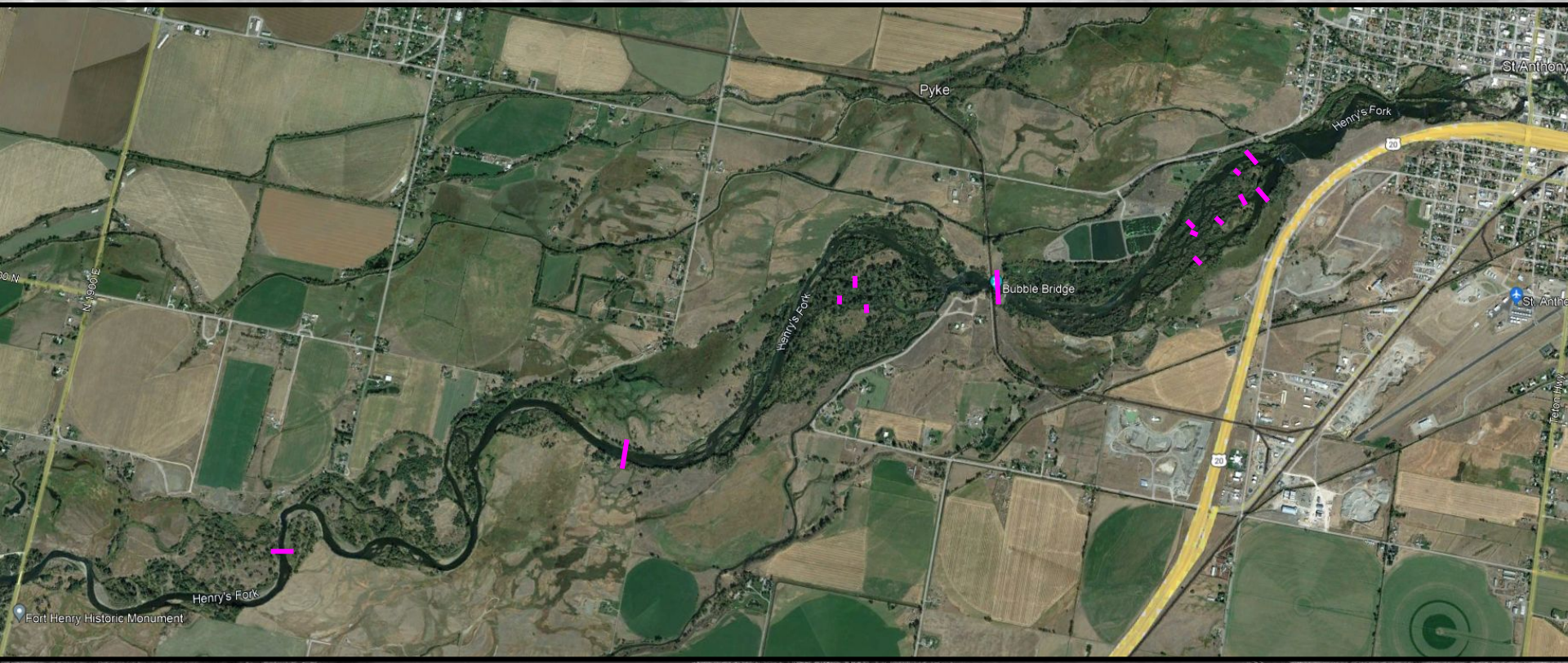
Channel Width

Depth

Velocity

Hydraulic data

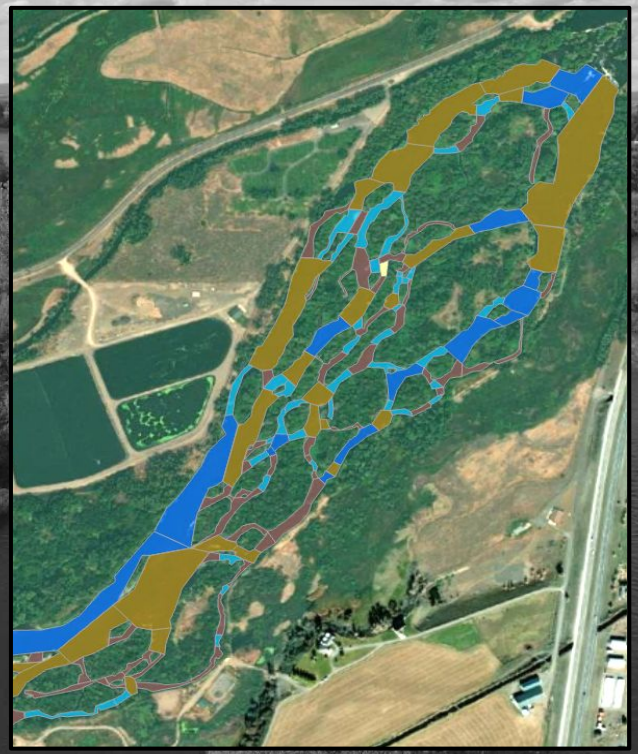
Summers 2019-2021



Hydraulic data

Summers 2019-2021

Sampled at 14 sites chosen to represent 10 habitat types
Collected data at flows 150-1700 cfs

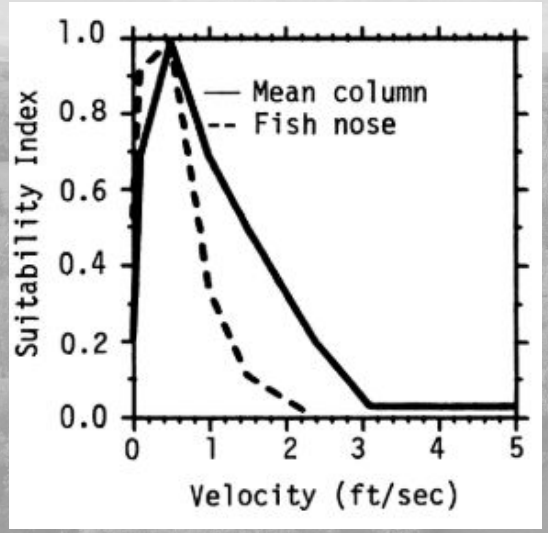


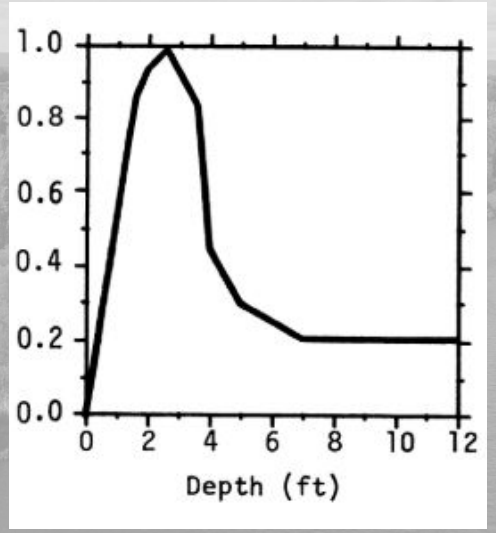
Habitat mapping

Summer 2020

Suitability modeling

Winter 2021-Spring 2022



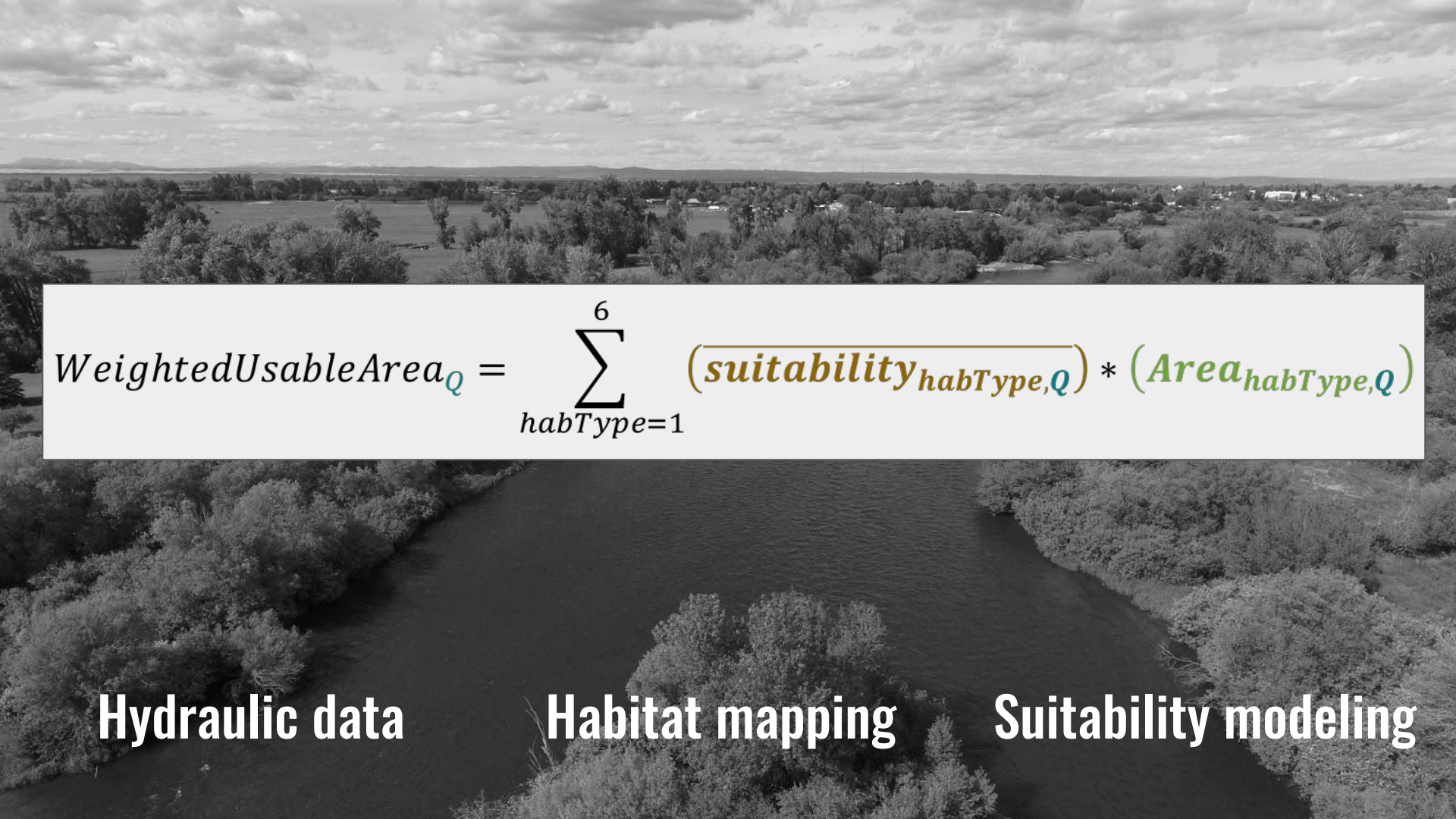


(Raleigh et al. 1986: Habitat suitability index models and instream flow suitability curves: Brown trout, revised)

- Compute suitability within each habitat type for juveniles, adults, spawners for BRN, RBT, MWF
- Create statistical relationship between suitability and streamflow

Suitability modeling

Winter 2021-Spring 2022



$$WeightedUsableArea_Q = \sum_{habType=1}^{6} \left(\overline{suitability_{habType,Q}}\right) * \left(Area_{habType,Q}\right)$$

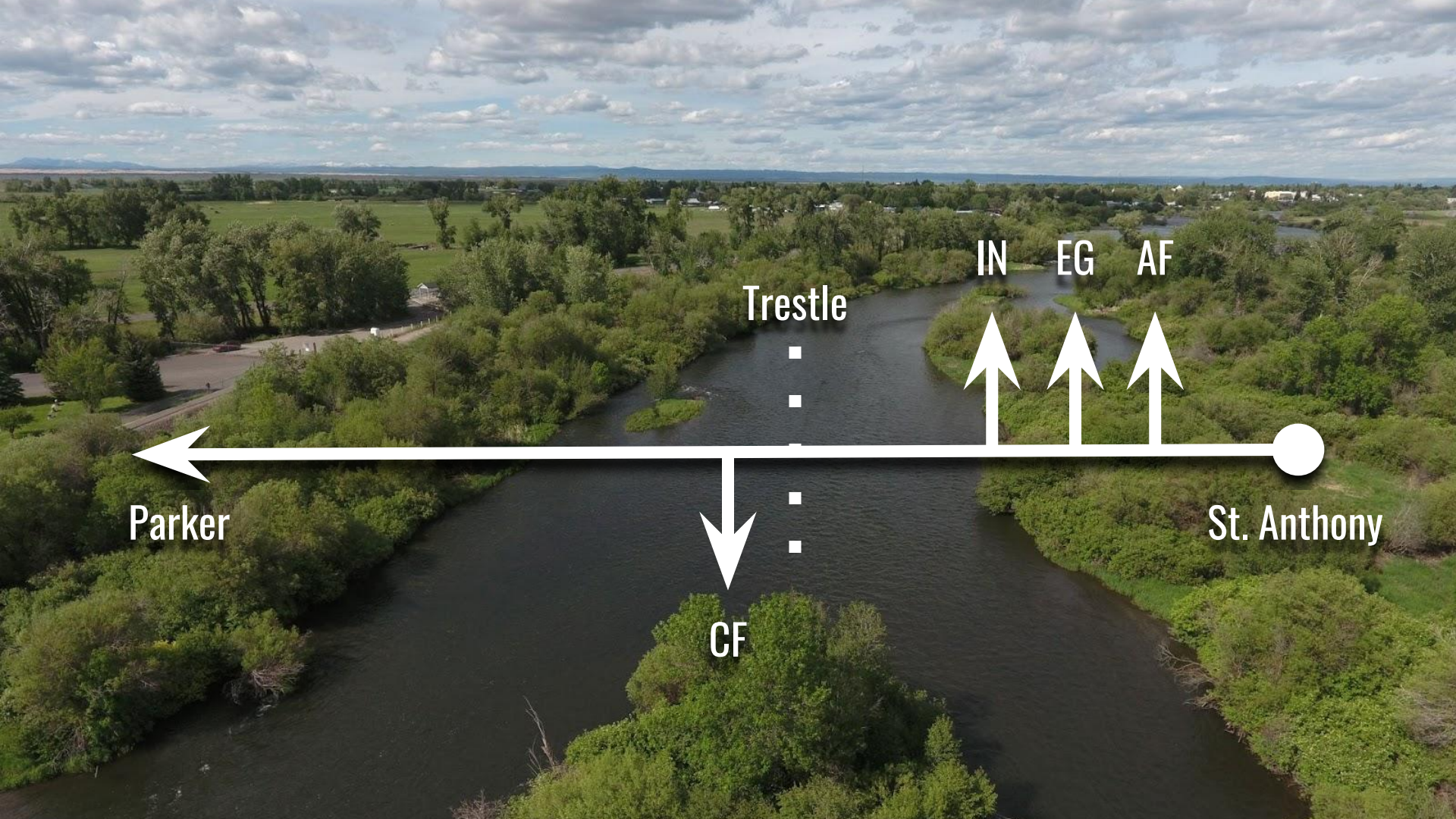
Hydraulic data

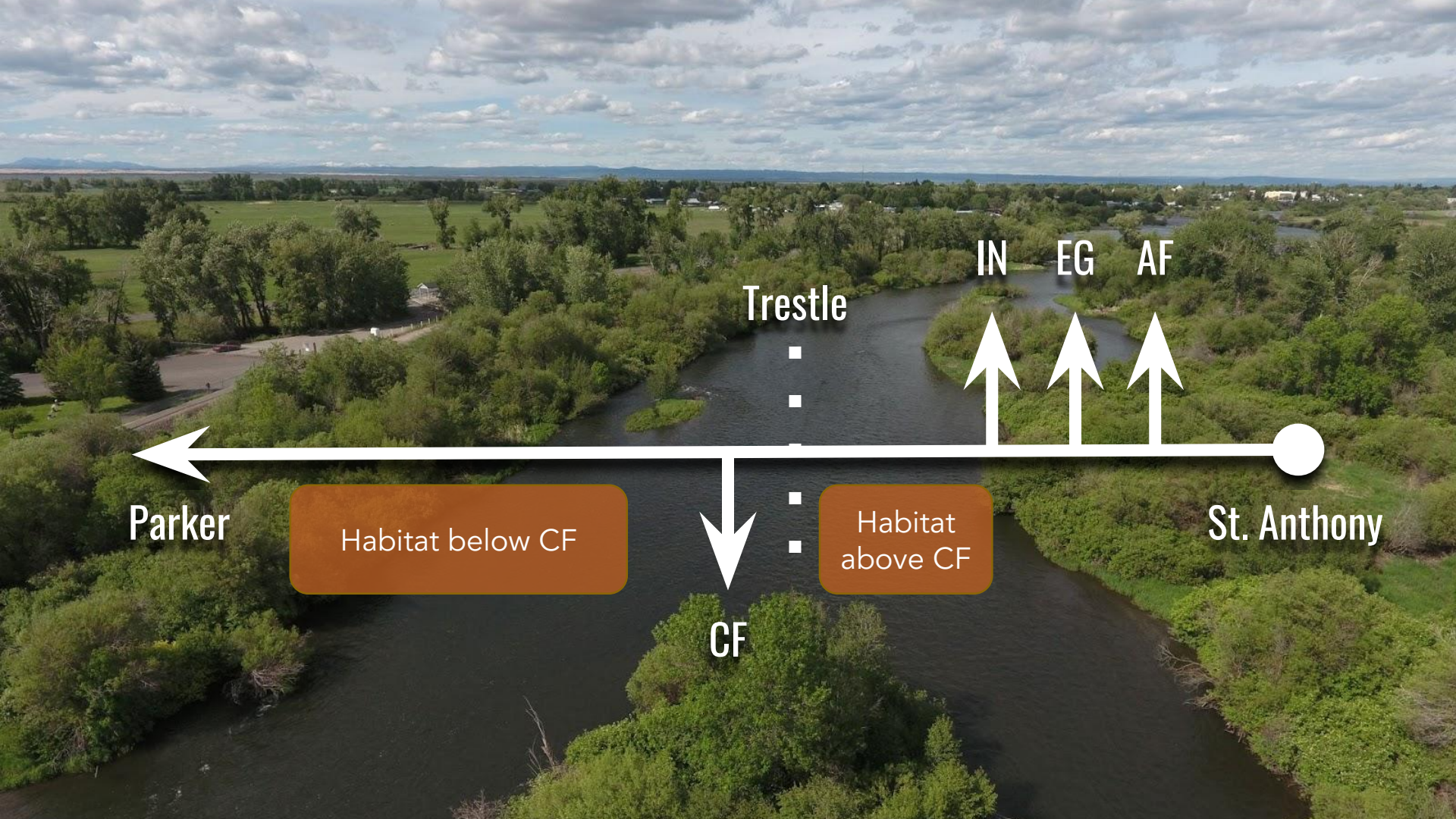
Habitat mapping

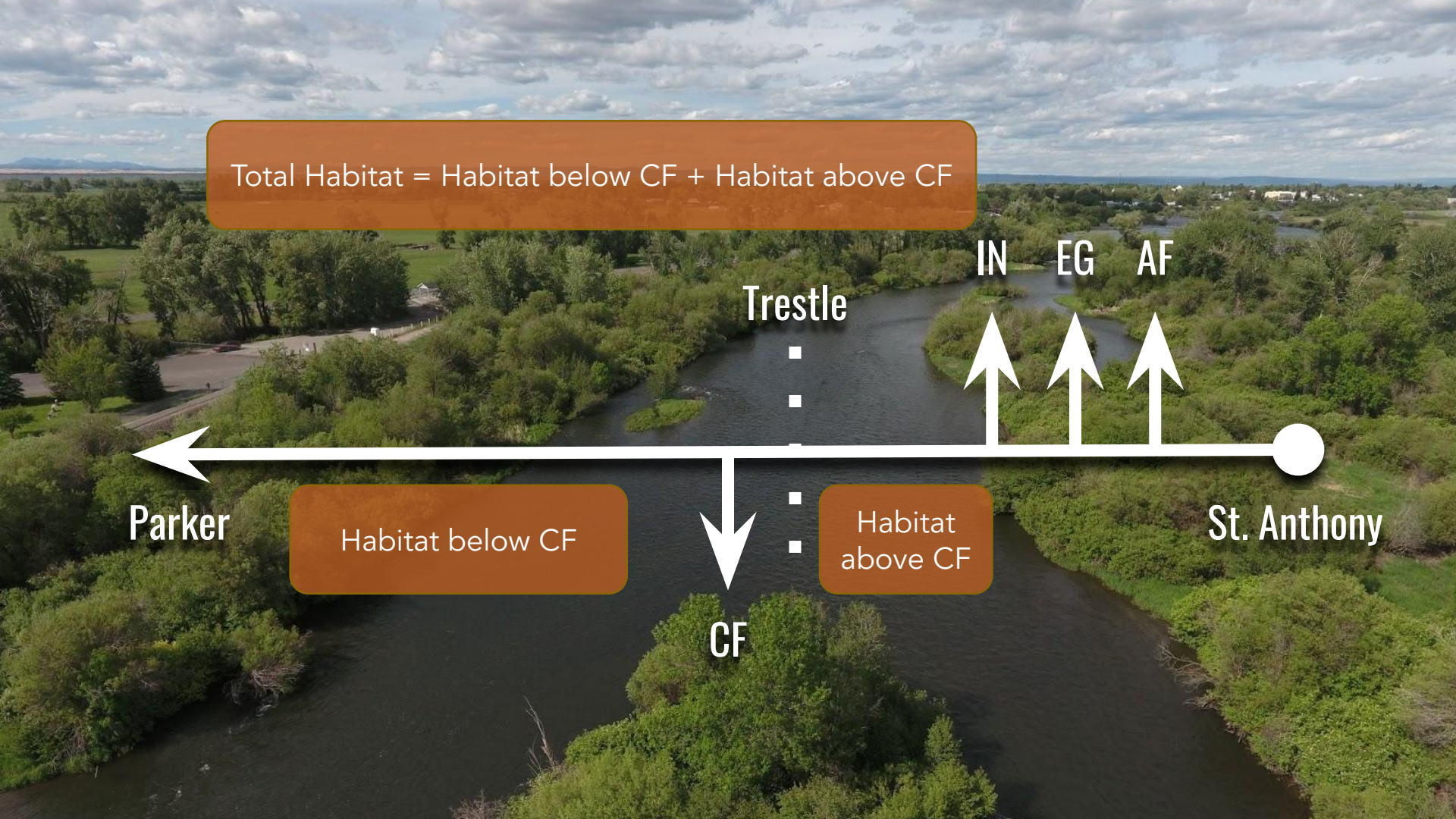
Suitability modeling

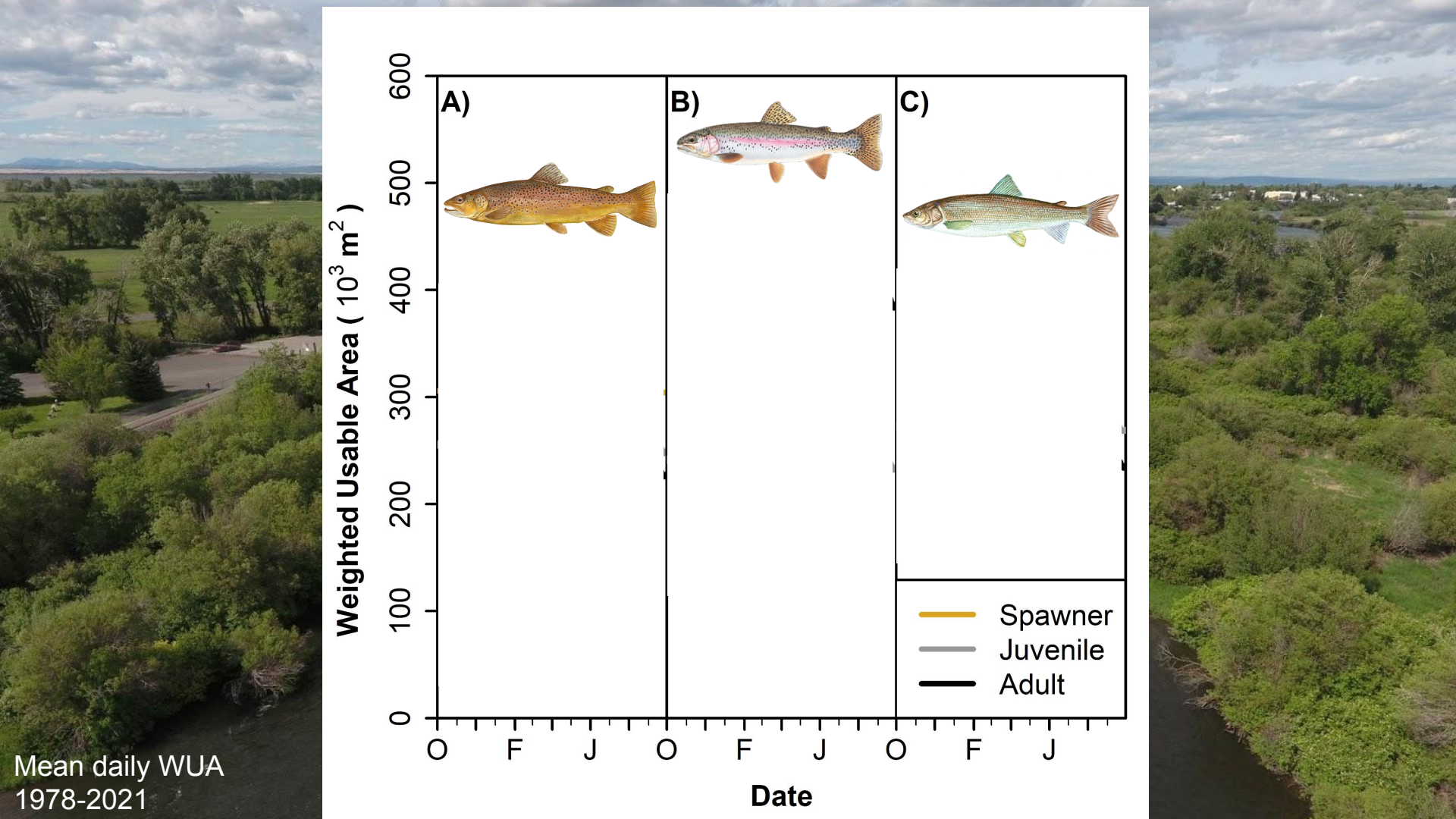
What we know now

- Lower Henry's Fork flow changes with canal diversions

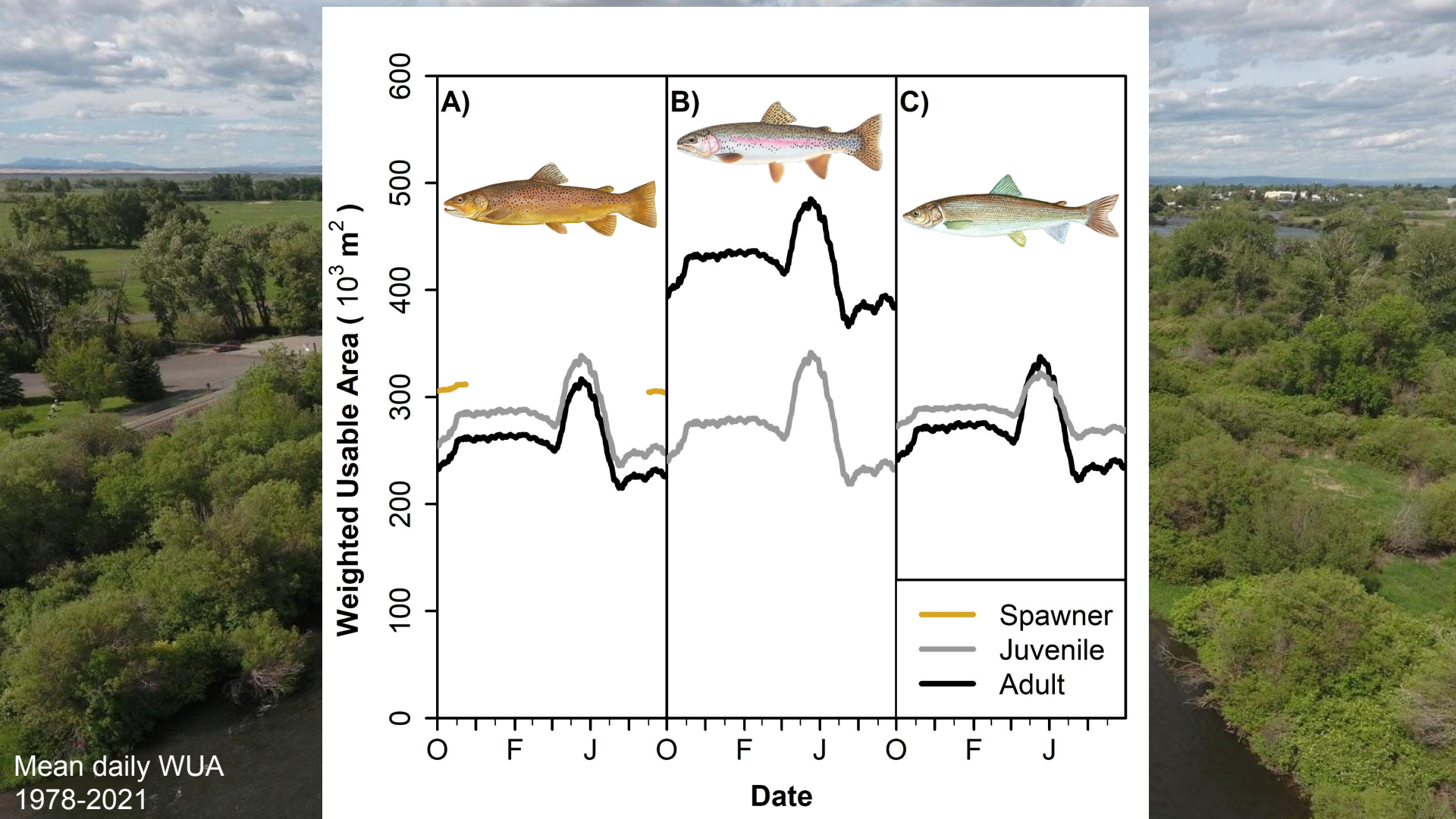

IN
EG
AF
Trestle
Parker
St. Anthony
CF


IN
EG
AF
Trestle
Parker
Habitat below CF
Habitat above CF
St. Anthony
CF


Total Habitat = Habitat below CF + Habitat above CF
IN
EG
AF
Trestle
Parker
Habitat below CF
Habitat above CF
St. Anthony
CF

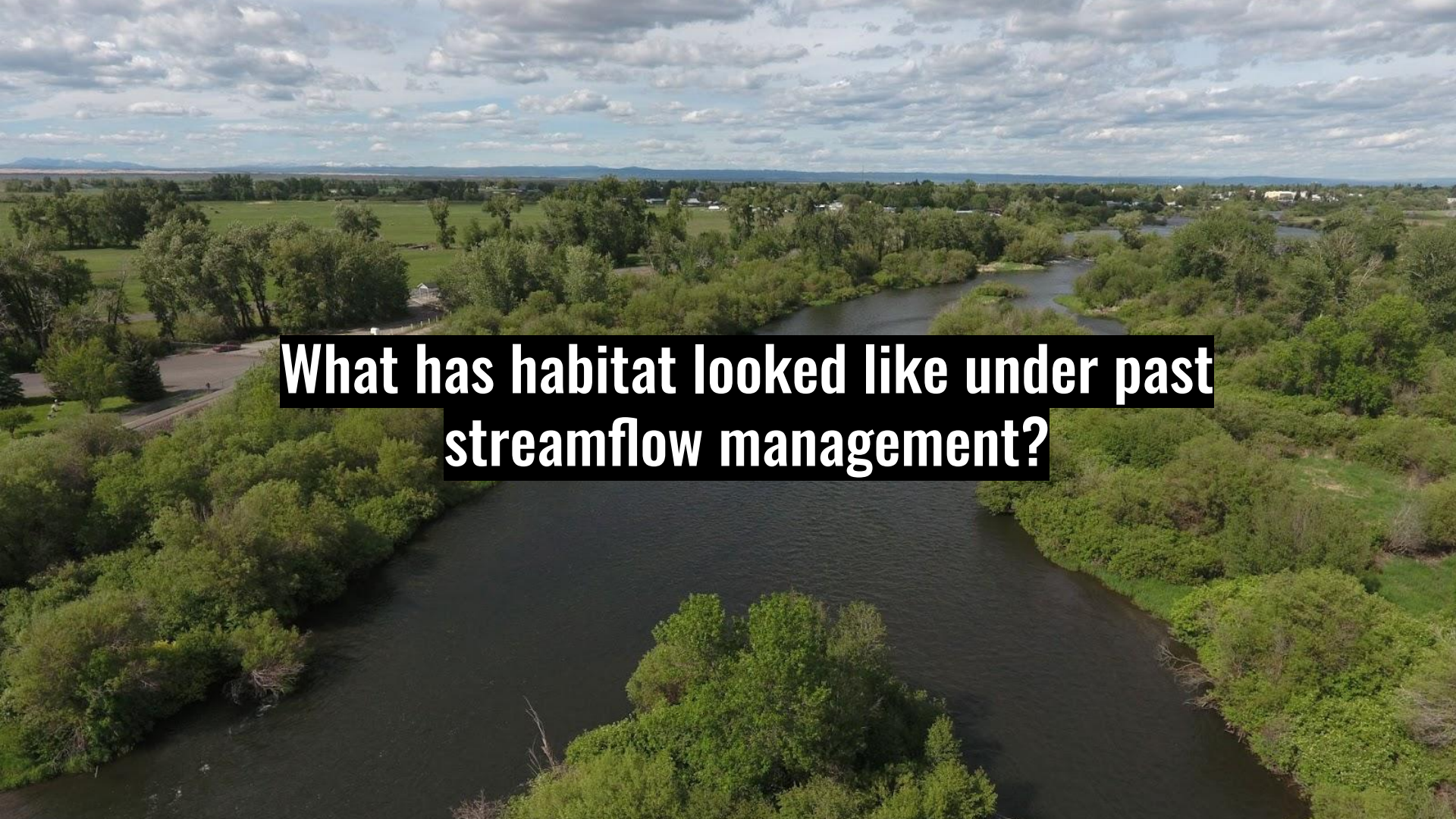


Mean daily WUA
1978-2021



Mean daily WUA
1978-2021


Where should the target be?
What should the target be?

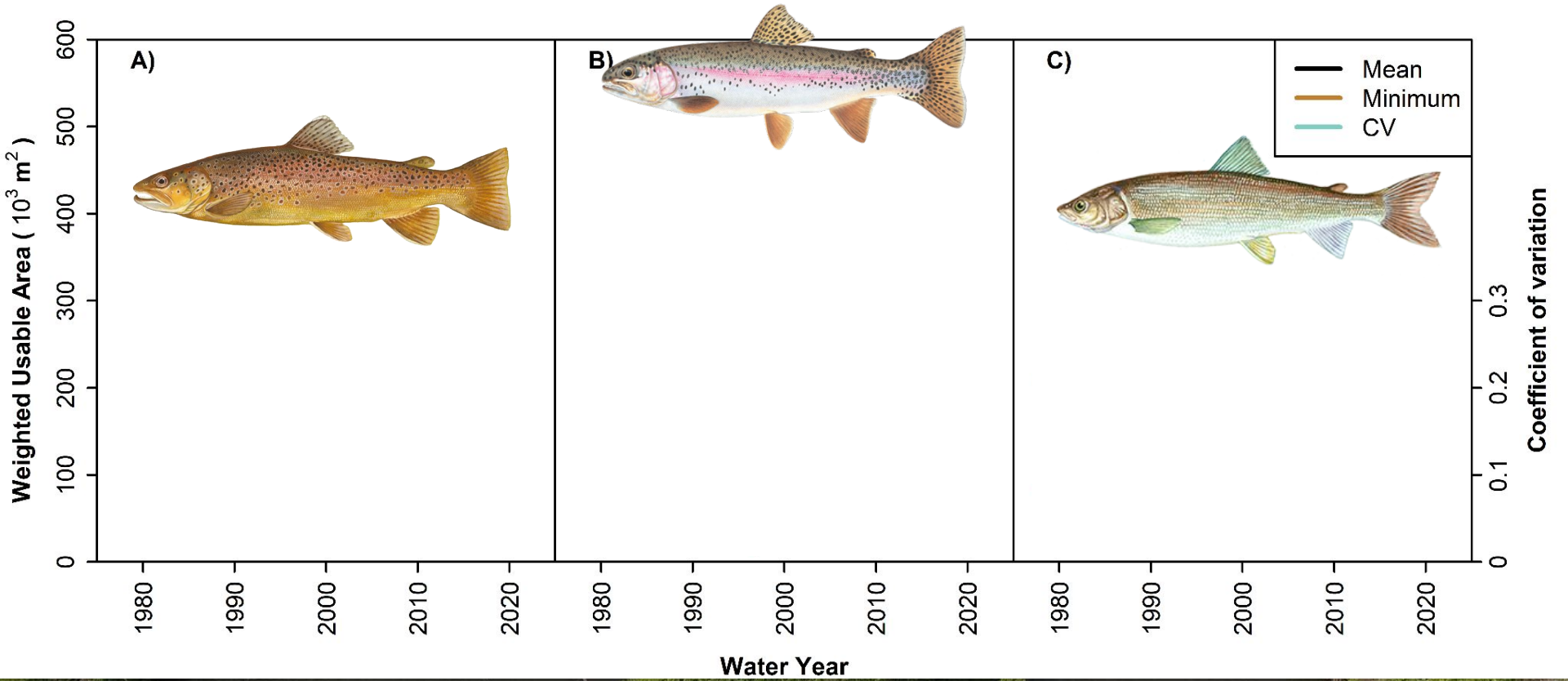

What has habitat looked like under past streamflow management?

What has habitat looked like under past streamflow management?

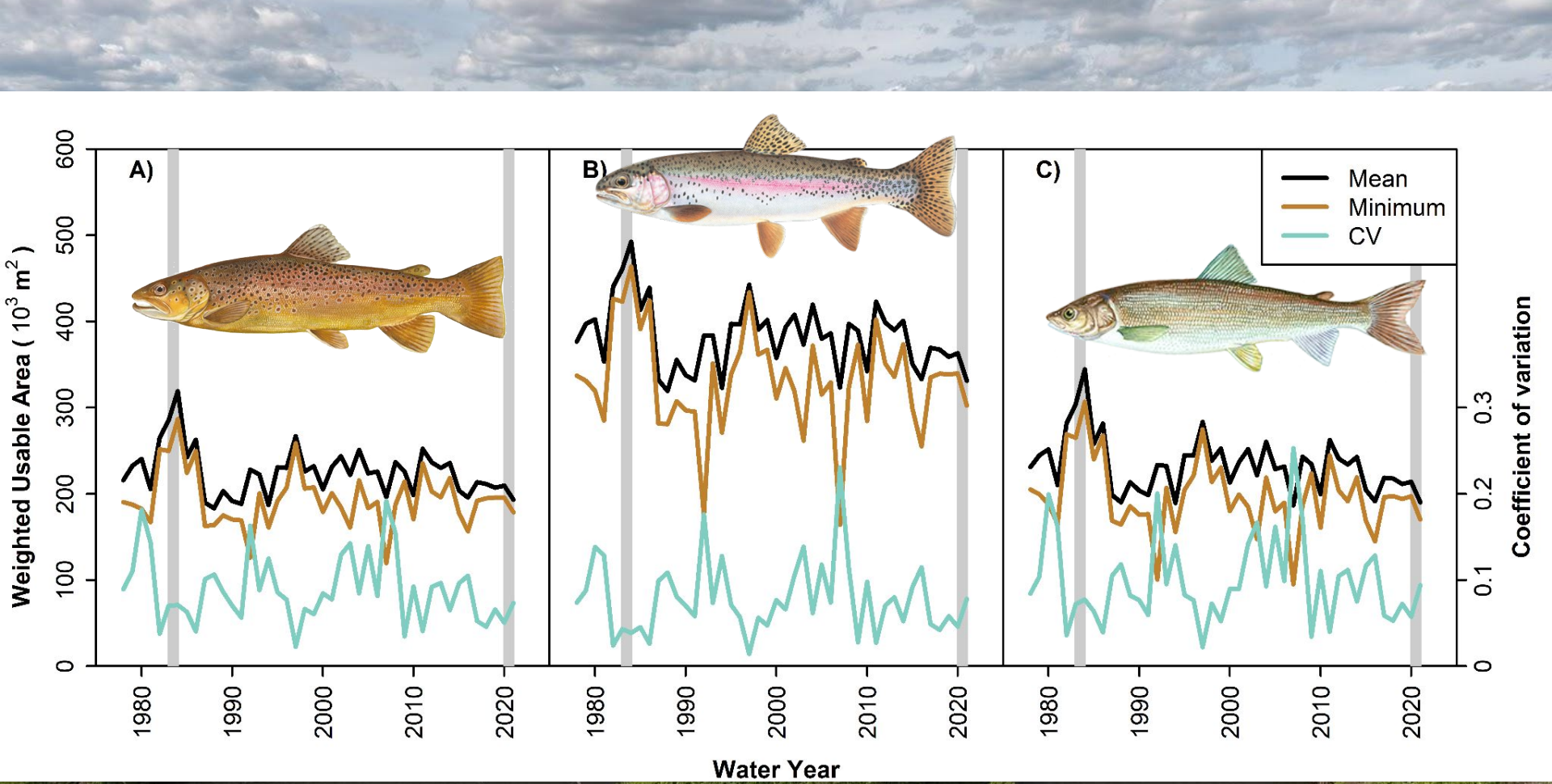
Pre-2003:
“Rules of thumb”

2003-2019:
1000 cfs at St. Anthony

2020-present:
350 cfs at Parker



During the IPR draft period for each WY



During the IPR draft period for each WY

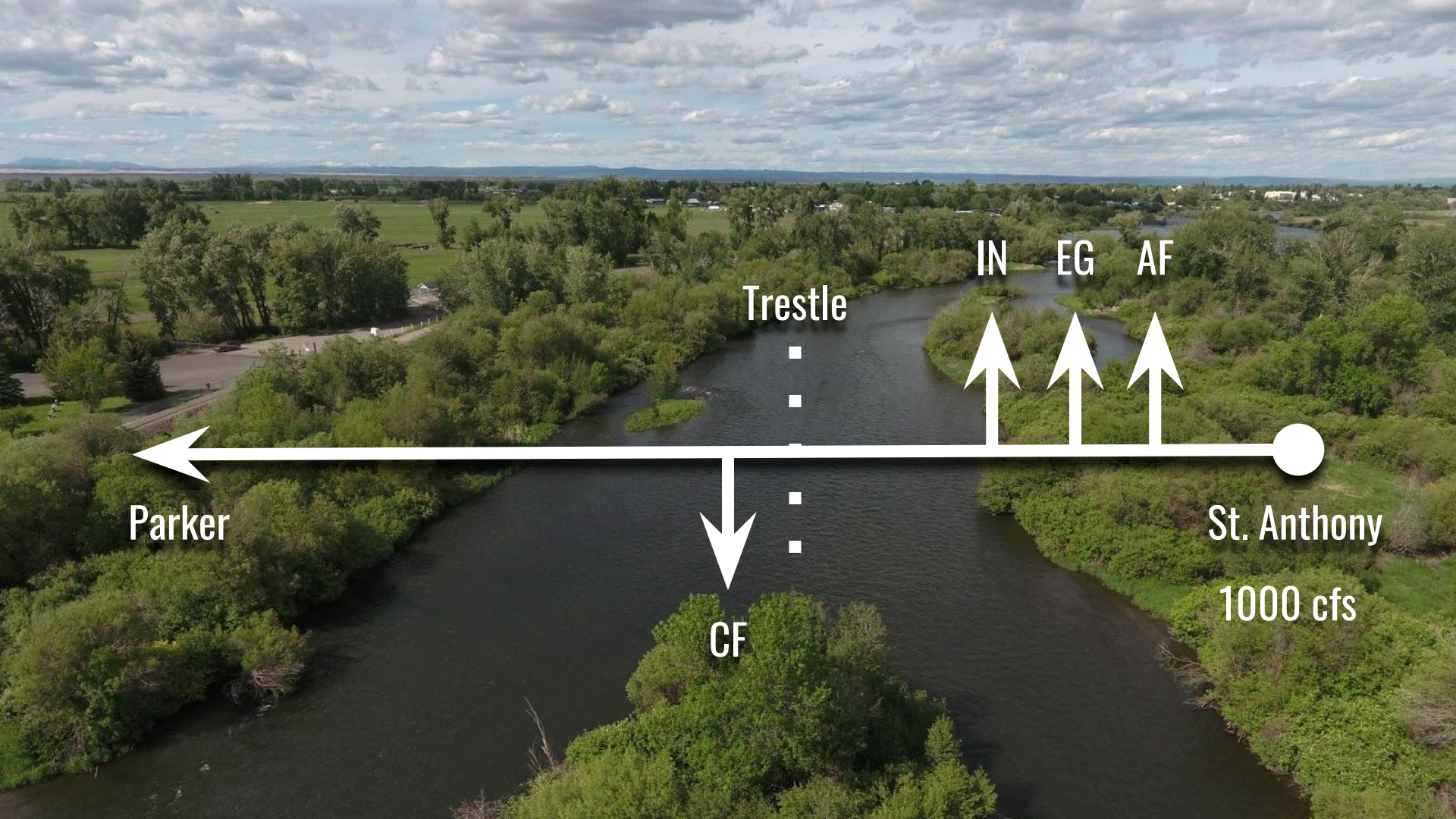
What we know now

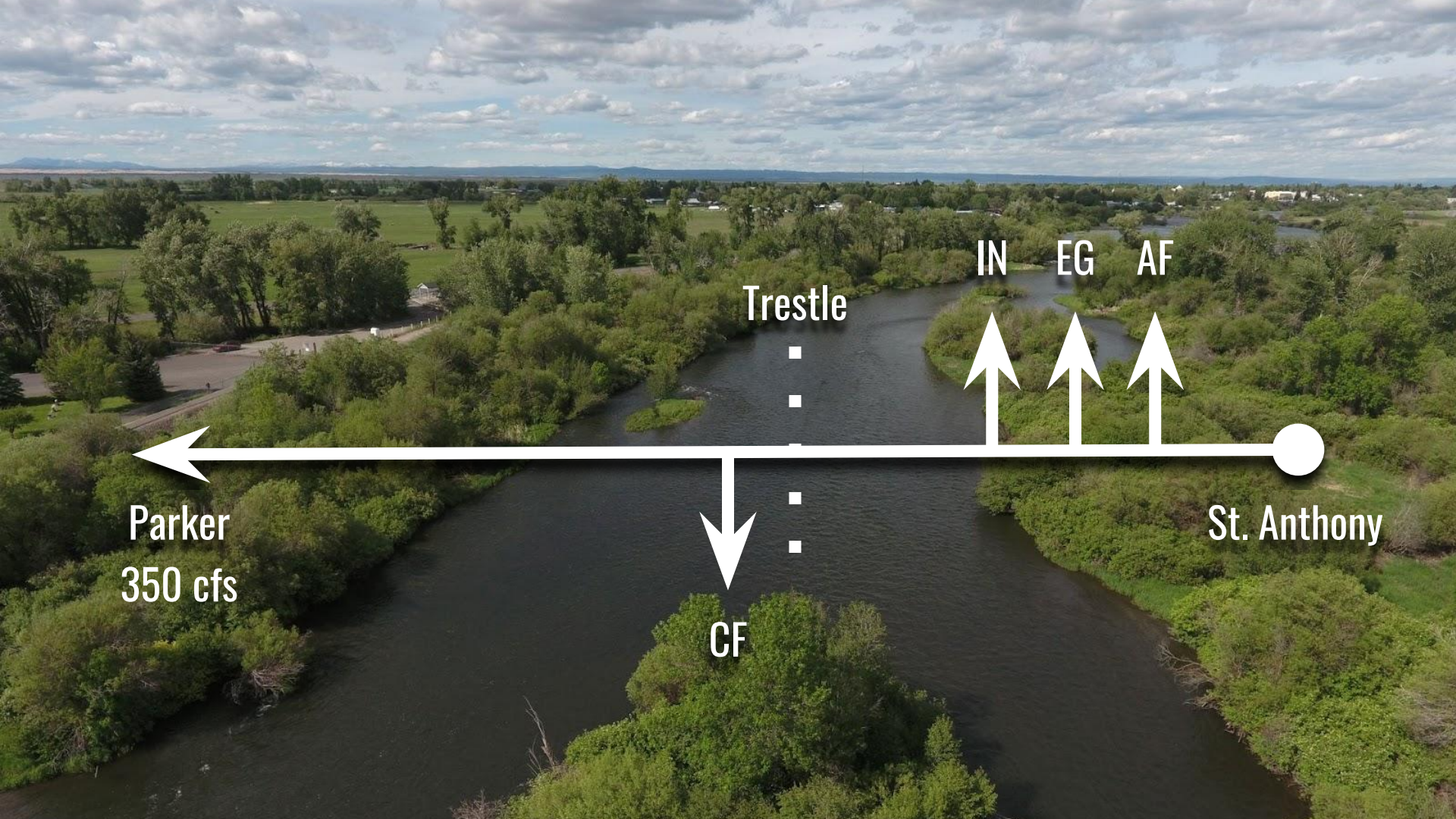
- WY1978-2021: mean fish habitat during reservoir draft season hasn’t changed

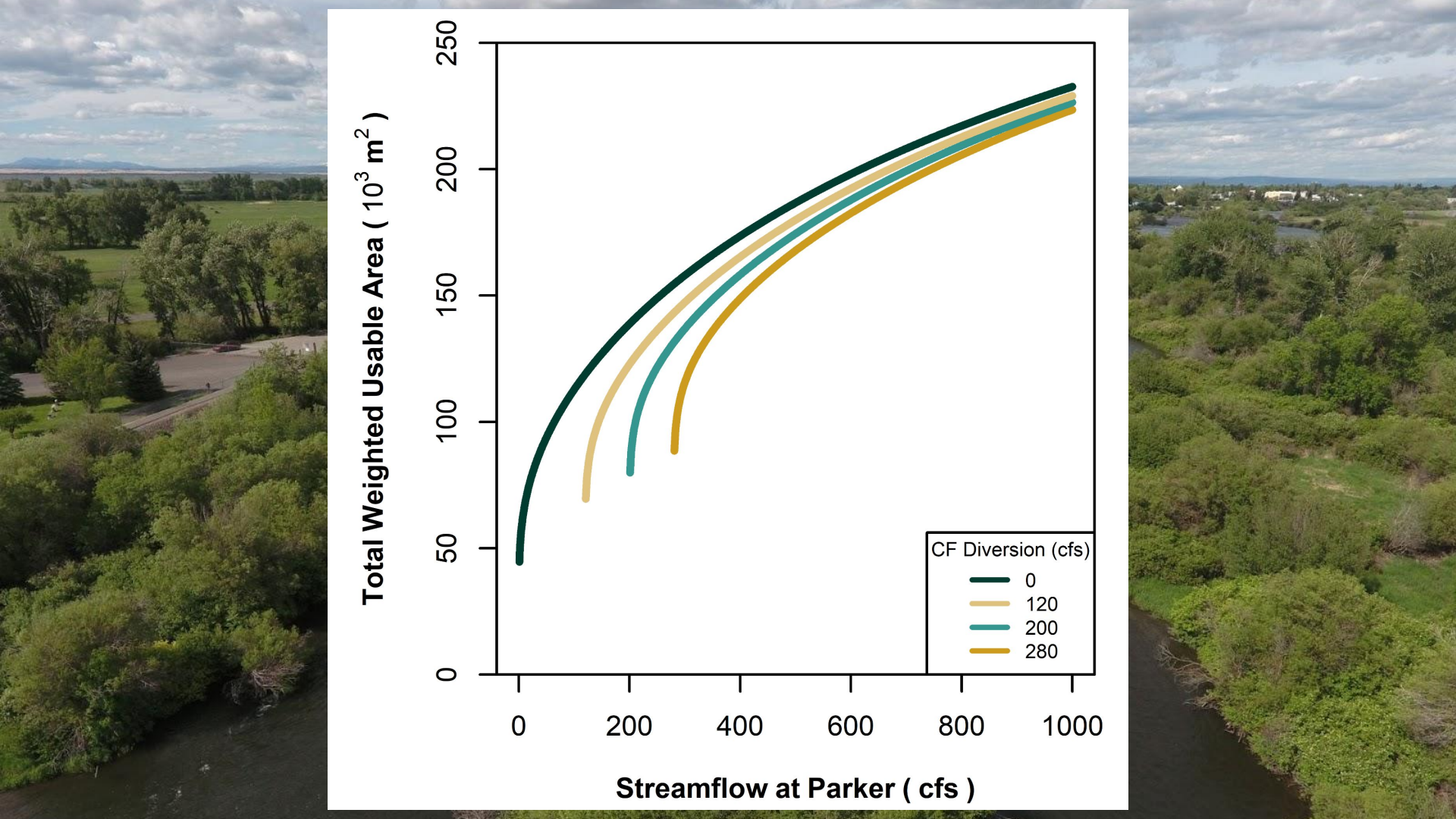
What we know now

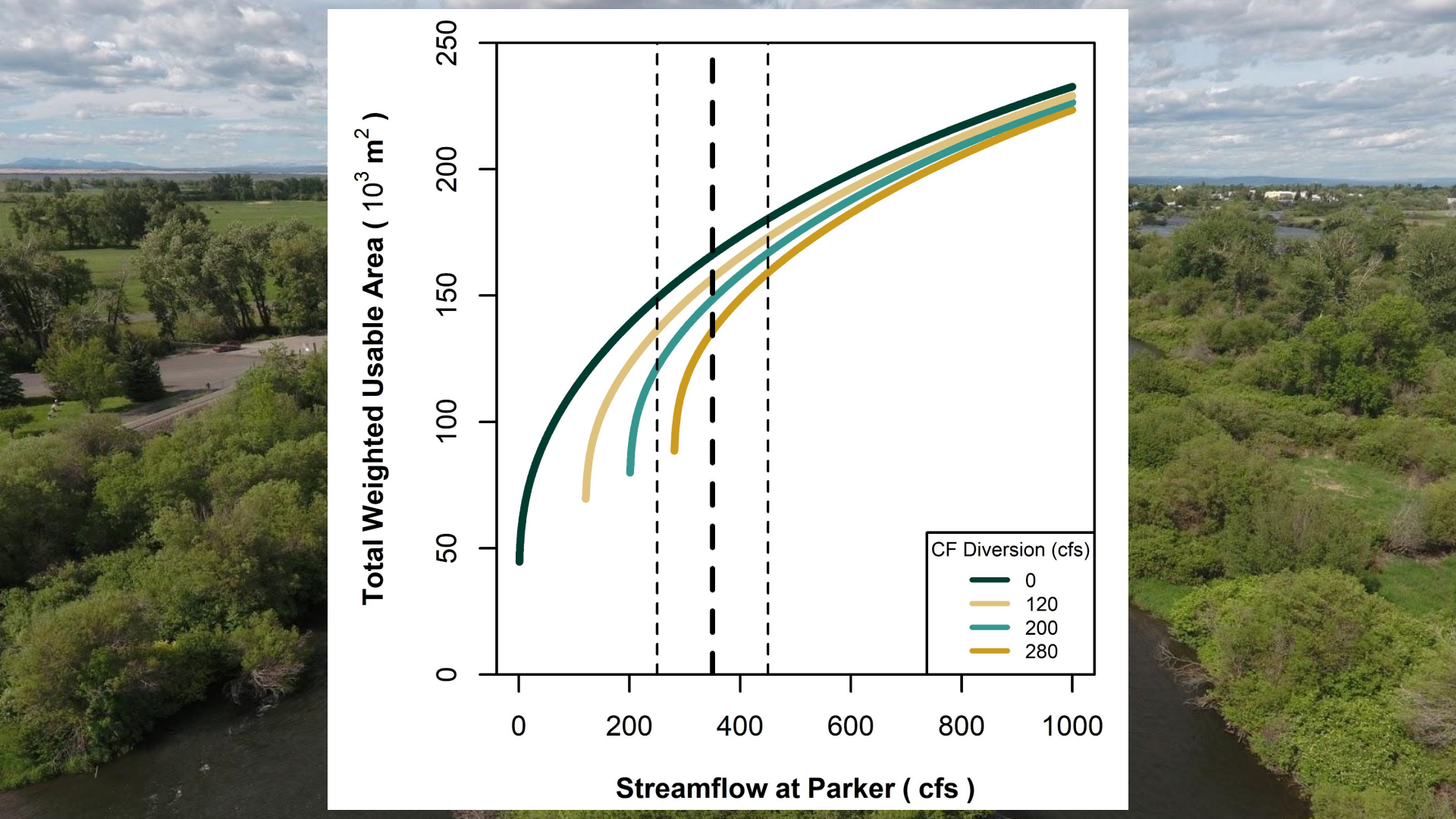
- WY2017-2021: Fish habitat has been more stable during reservoir draft season


Where should the target be?
What should the target be?


IN
EG
AF
Trestle
Parker
St. Anthony
1000 cfs
CF

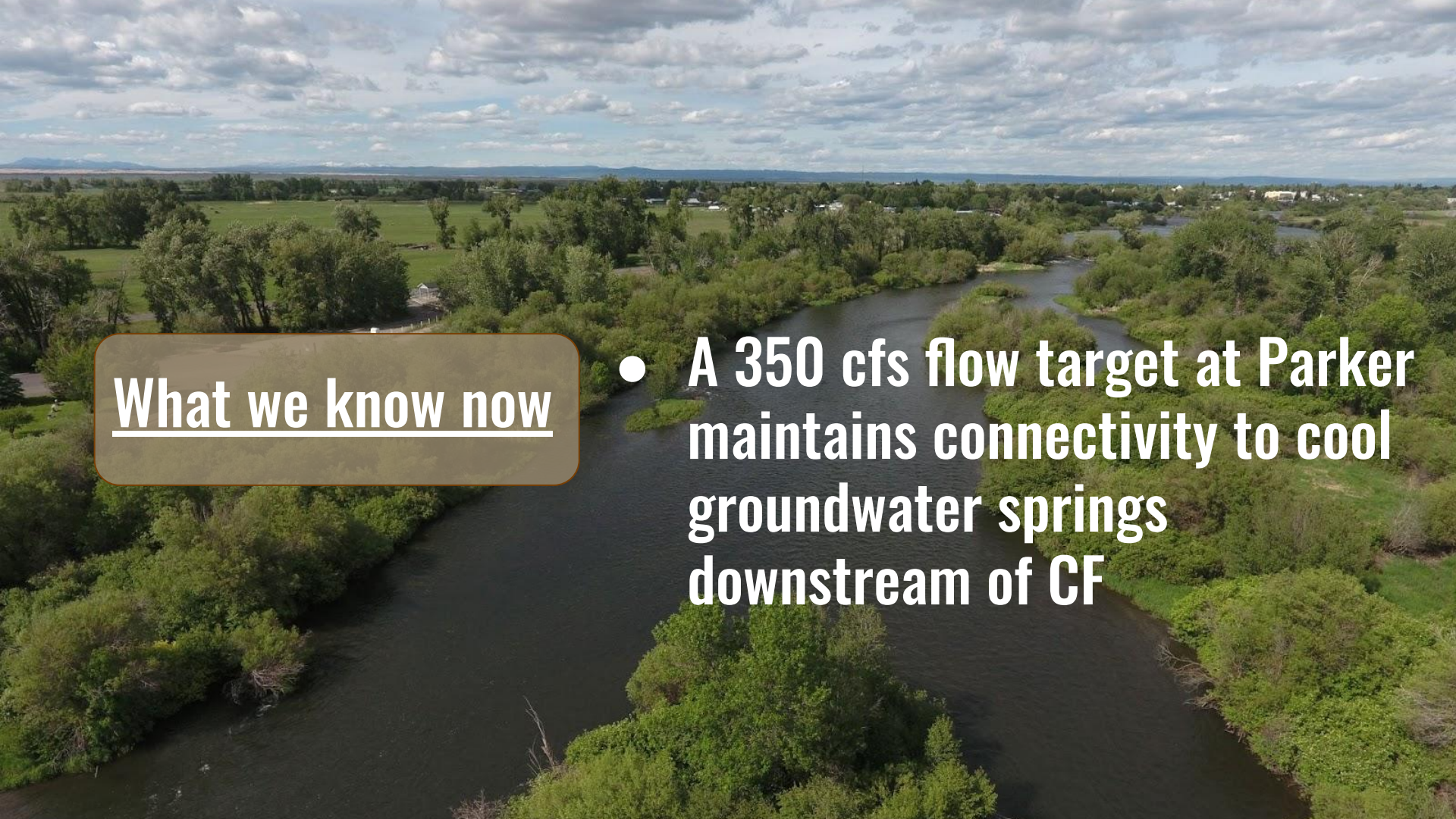

IN
EG
AF
Trestle
Parker
350 cfs
St. Anthony
CF


Total Weighted Usable Area (10^3 m^2)
0
50
100
150
200
250
0
200
400
600
800
1000
Streamflow at Parker (cfs)
CF Diversion (cfs)
0
120
200
280


Total Weighted Usable Area (10^3 m^2)
0
50
100
150
200
250
0
200
400
600
800
1000
Streamflow at Parker (cfs)
CF Diversion (cfs)
0
120
200
280

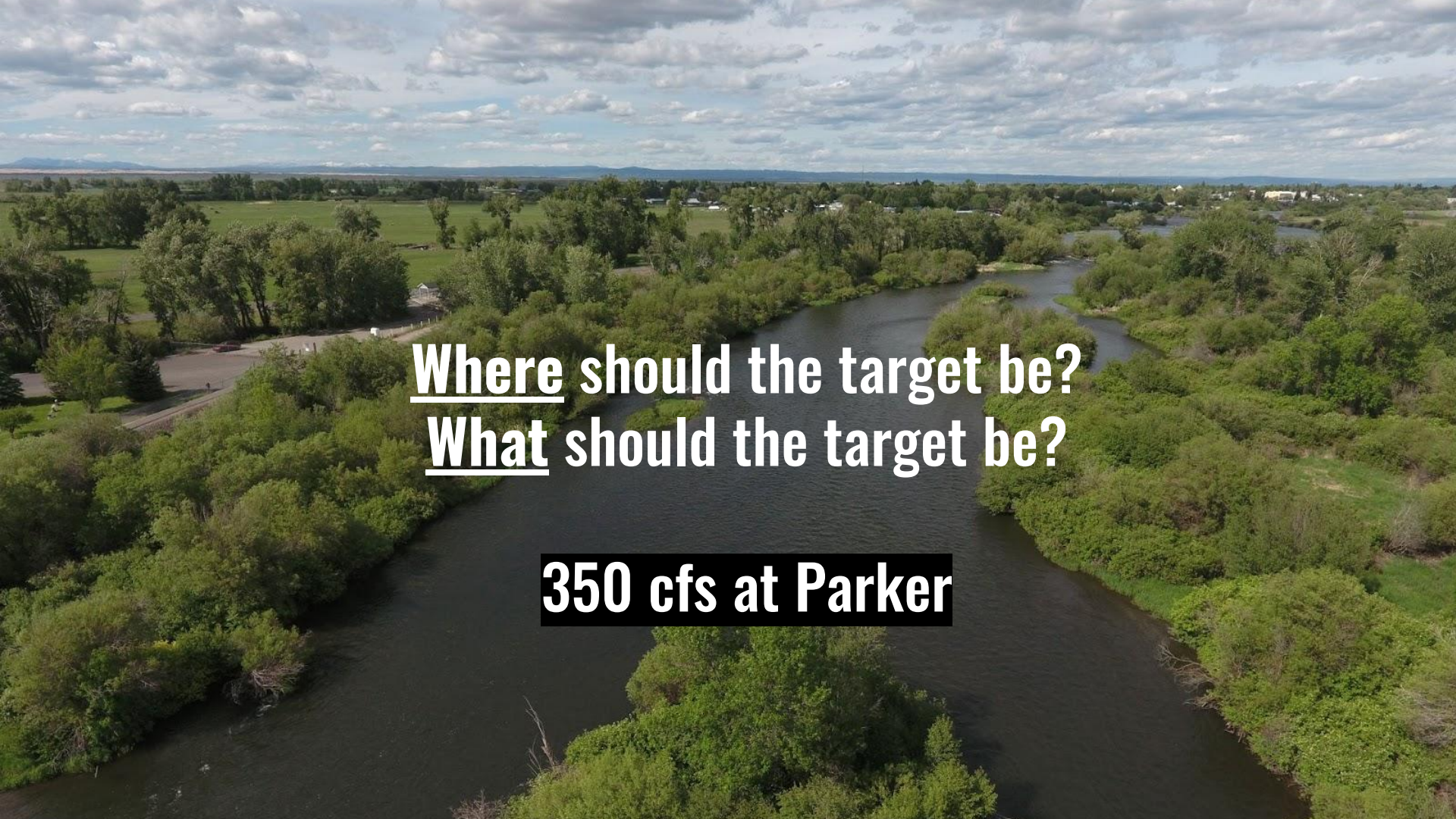
What we know now

- A 350 cfs flow target at Parker provides a habitat range buffer for CF diversion volume



What we know now

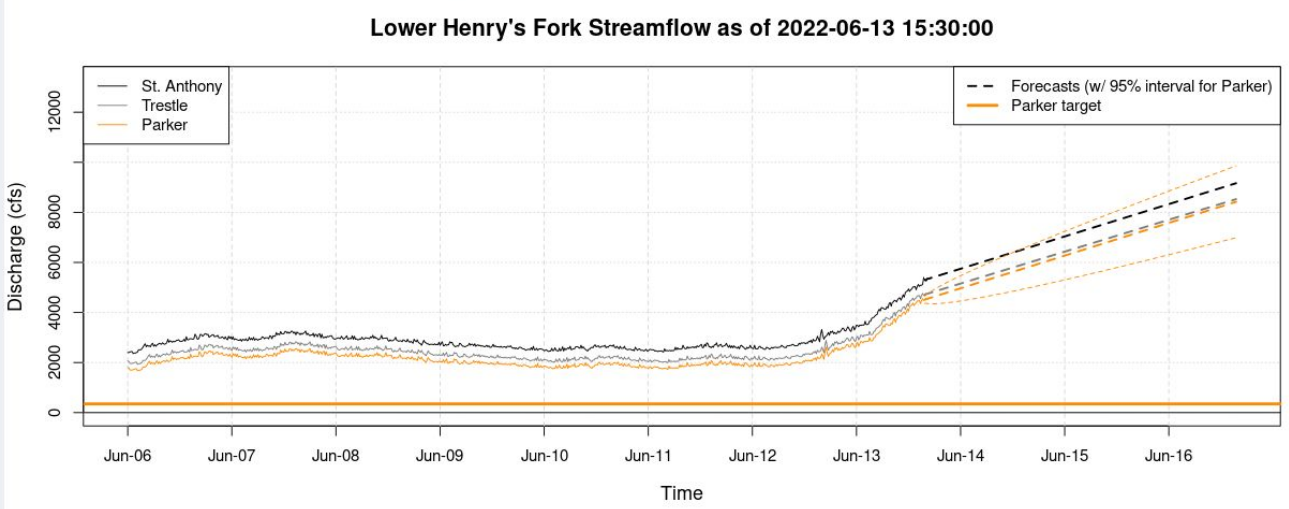
- A 350 cfs flow target at Parker maintains connectivity to cool groundwater springs downstream of CF


Where should the target be?
What should the target be?
350 cfs at Parker

Project Impact

Real-Time Flow of the Lower Henry's Fork

Please email questions or comments to rob@henrysfork.org and visit henrysfork.org for more information on The Henry's Fork Foundation, The Voice of the River



Creation of real-time flow website used by managers daily

Project Impact

- WY 2020: Saved **1,226** acre-ft in Island Park Reservoir
- WY 2021: Saved **2,400** acre-ft in Island Park Reservoir

Project Impact

- WY 2020: Saved **1,226** acre-ft in Island Park Reservoir
- WY 2021: Saved **2,400** acre-ft in Island Park Reservoir

- Allowed earlier fill of Island Park Reservoir
- Benefits kokanee fishery upstream of reservoir
- Benefits Box Canyon recruitment
- Benefits water quality

- More stable draft-season habitat for lower Henry's Fork

Thank You!

Contact me:

christina@henrysfork.org

@lowerhenrysfork

Funding + Partners

CLIMATE ADAPTATION SCIENCE

NSF Grant No. 1633756

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London Bernier
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