EVALUATION OF THE ECOLOGICAL AND HYDRAULIC CONDITIONS OF THE RESILIENT ST. VRAIN PROJECT (LONGMONT, COLORADO)

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RESILIENT ST VRAIN PROJECT

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Collaboration with Front Range Community College and funded by City of Longmont

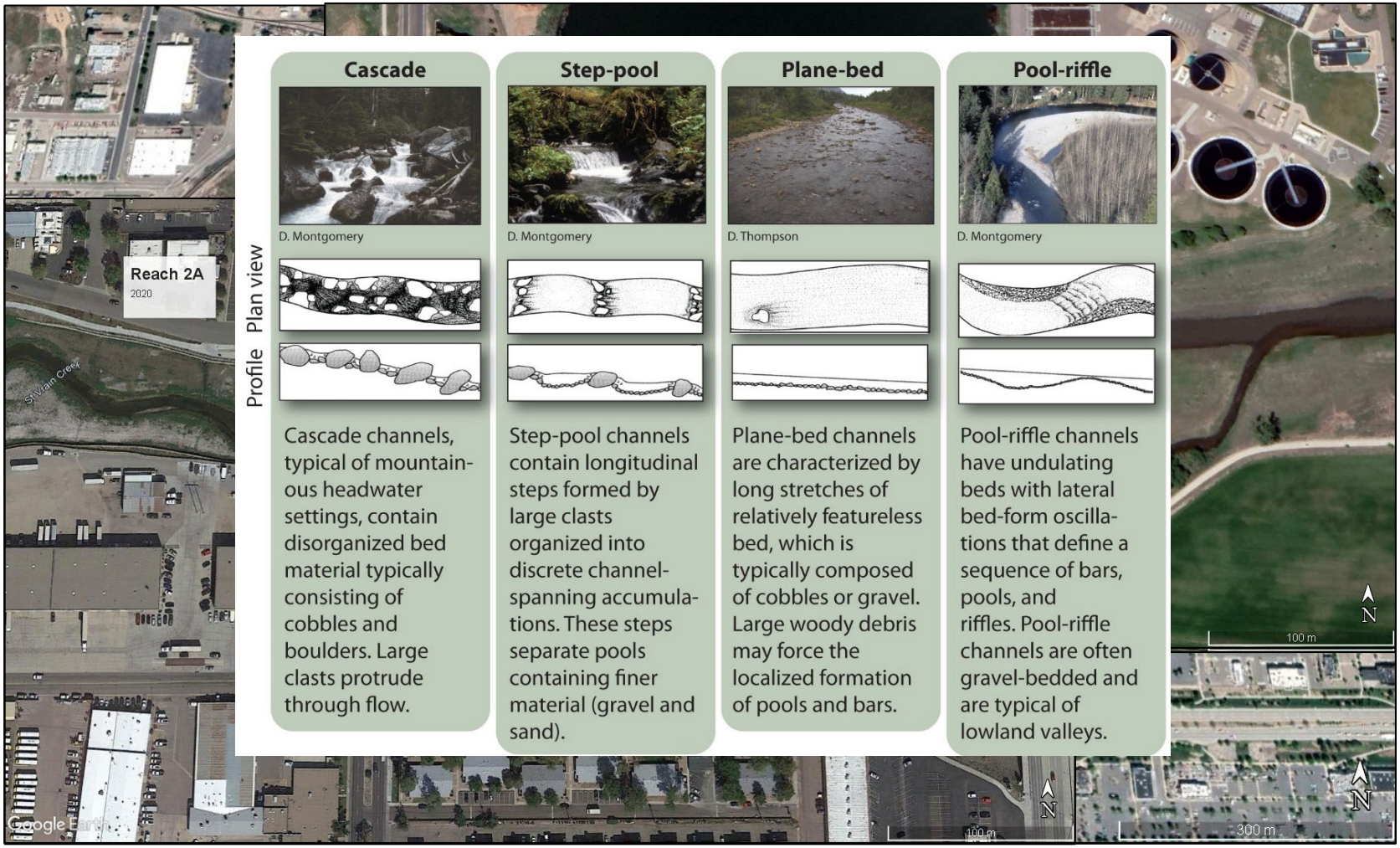
RESILIENT ST VRAIN PROJECT GOALS

- Objectives of the project included
  - 1) Restore and revitalize creek;
  - 2) Safeguard residents businesses and infrastructure by reducing the size of the St. Vrain floodplain in Longmont
  - 3) Ensure a conveyance capacity for a 100-year flood through widening the creek and using natural channel design to stabilize the creek such that habitat is maintained.
- The project will cost ~100 million dollars.

RESILIENT ST VRAIN ASSESSMENT OBJECTIVES

- Assess
  - 1) The health of the riparian system in terms of vegetation-channel-flow relationships,
  - 2) Geomorphic condition in terms of complexity and bed mobility
  - 3) The ability of the St. Vrain to withstand future 100-year flow events.

EXAMPLE: ST VRAIN, CO



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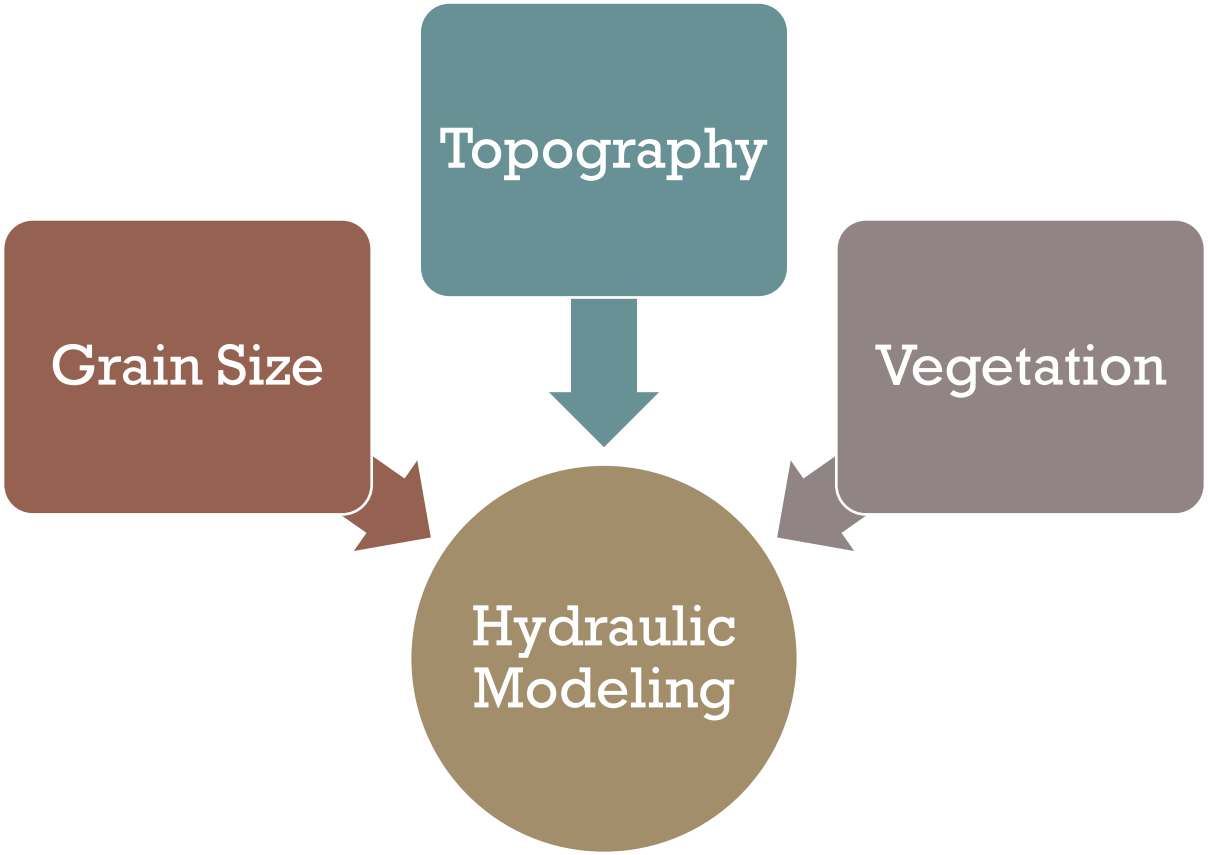
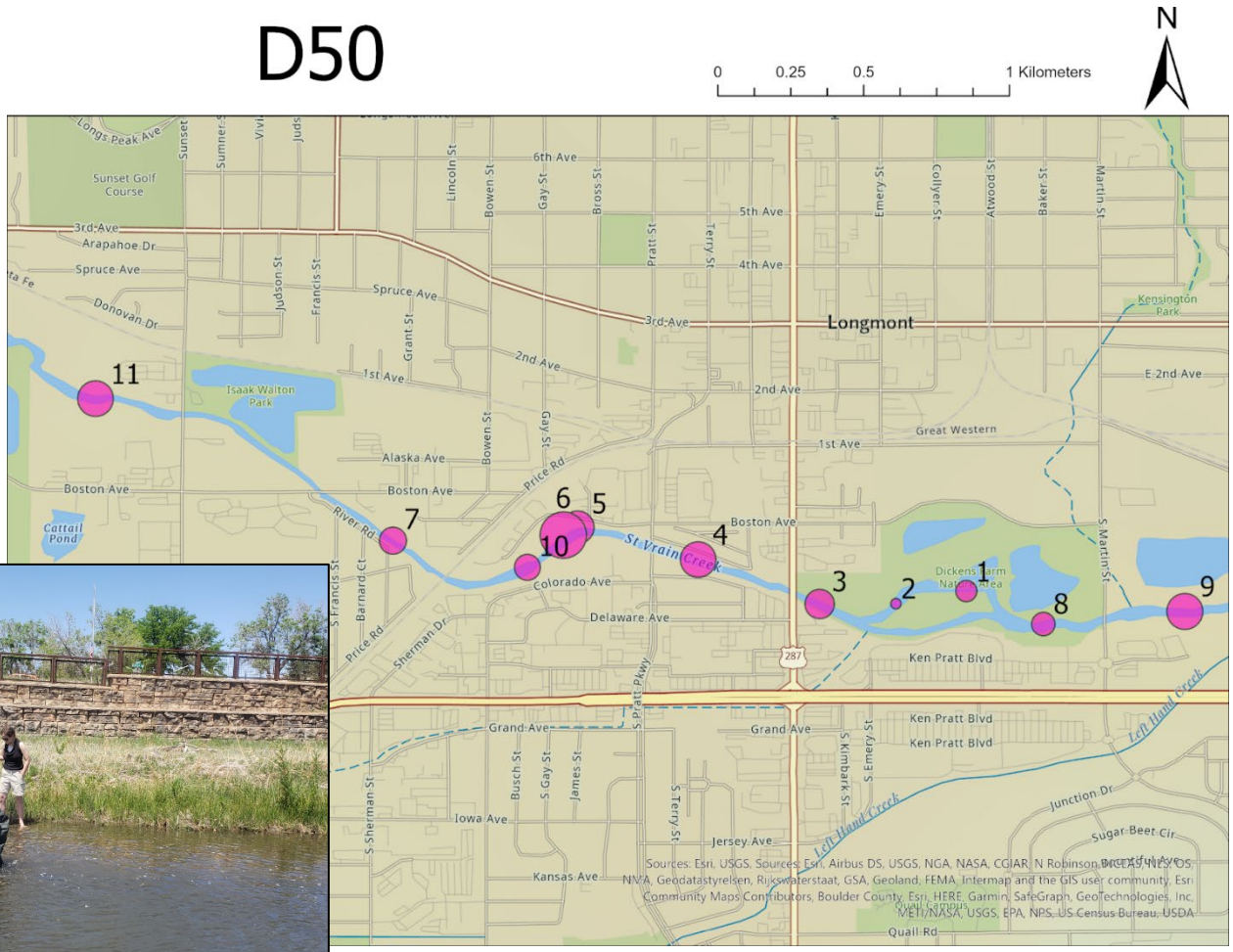
APPROACH

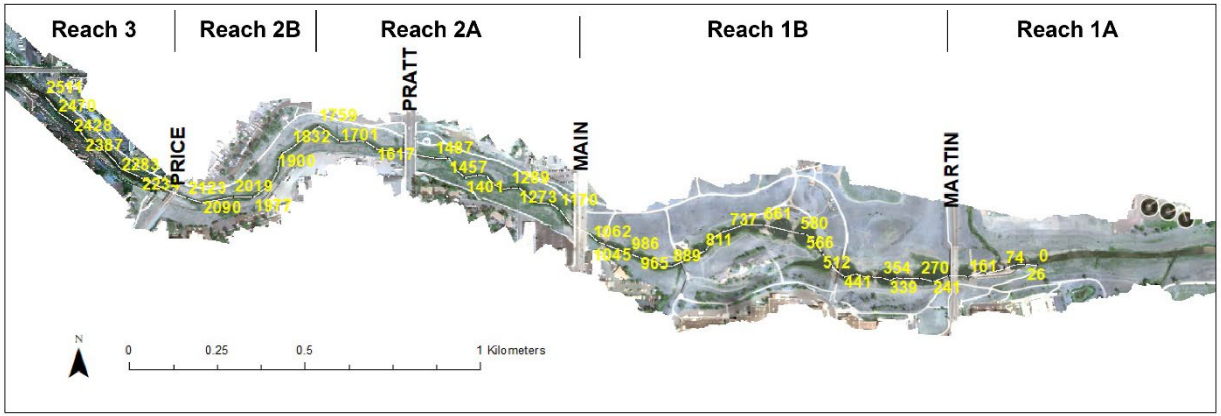


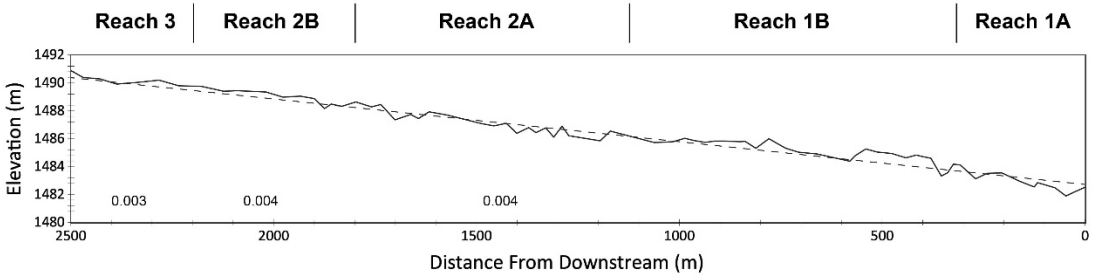
GRAIN SIZE

D50

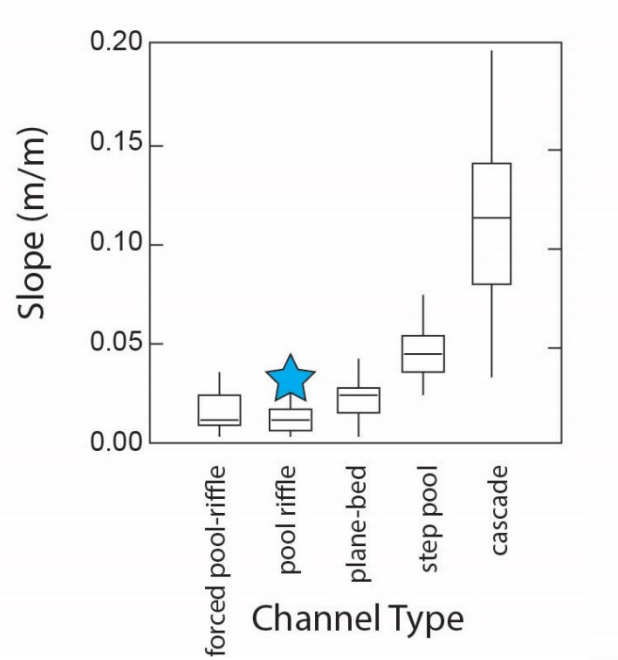


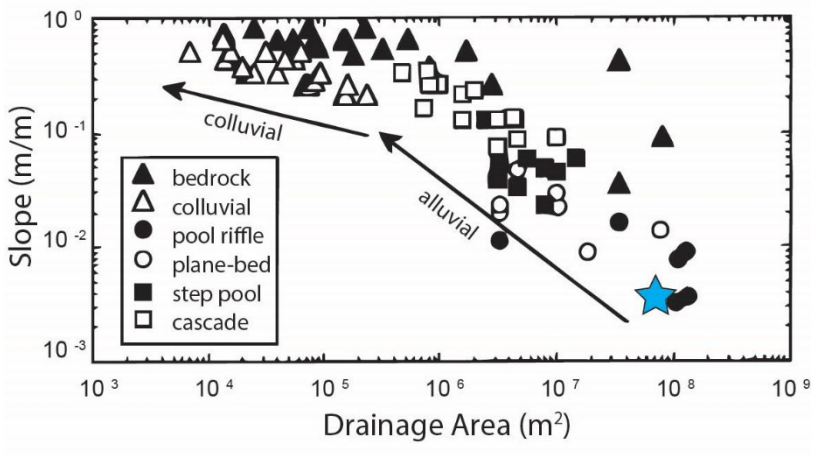
TOPOGRAPHY

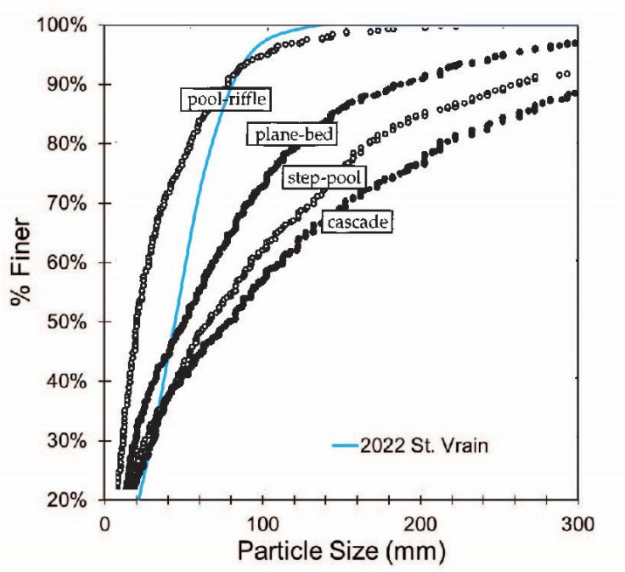

Reach 3
Reach 2B
Reach 2A
Reach 1B
Reach 1A
PRICE
PRATT
MAIN
MARTIN
2511
2478
2428
2387
2383
2239
2123
2019
2090
1977
1960
1759
1852
1701
1617
1487
1457
1401
1259
1279
1179
1062
1045
986
965
889
811
737
681
580
566
512
441
364
339
270
241
161
74
0
26
N
0
0.25
0.5
1 Kilometers


Reach 3
Reach 2B
Reach 2A
Reach 1B
Reach 1A
Elevation (m)
1492
1490
1488
1486
1484
1482
1480
0.003
0.004
0.004
2500
2000
1500
1000
500
0
Distance From Downstream (m)

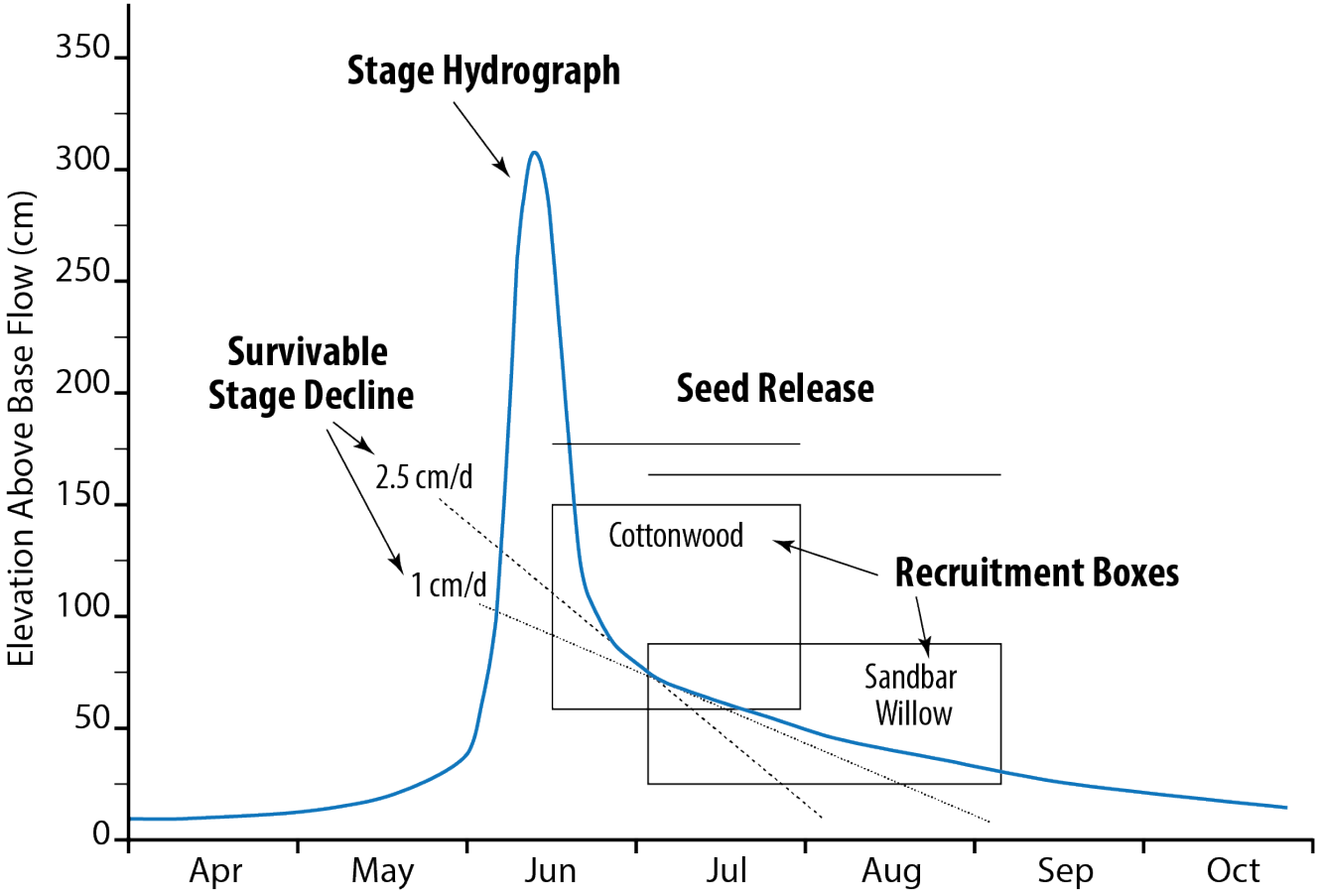
GEOMORPHOLOGY





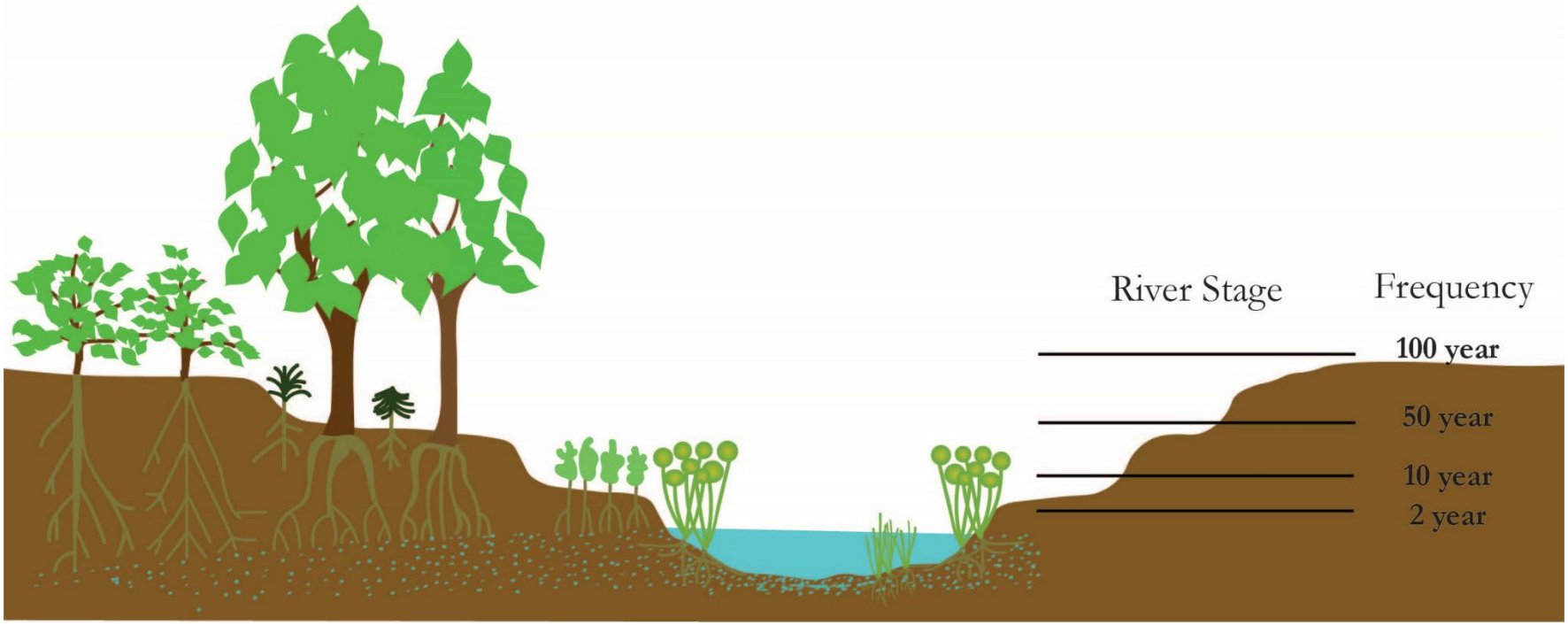


RIVERINE VEGETATION NEEDS FLOOD DISTURBANCE TO RECRUIT AND SURVIVE



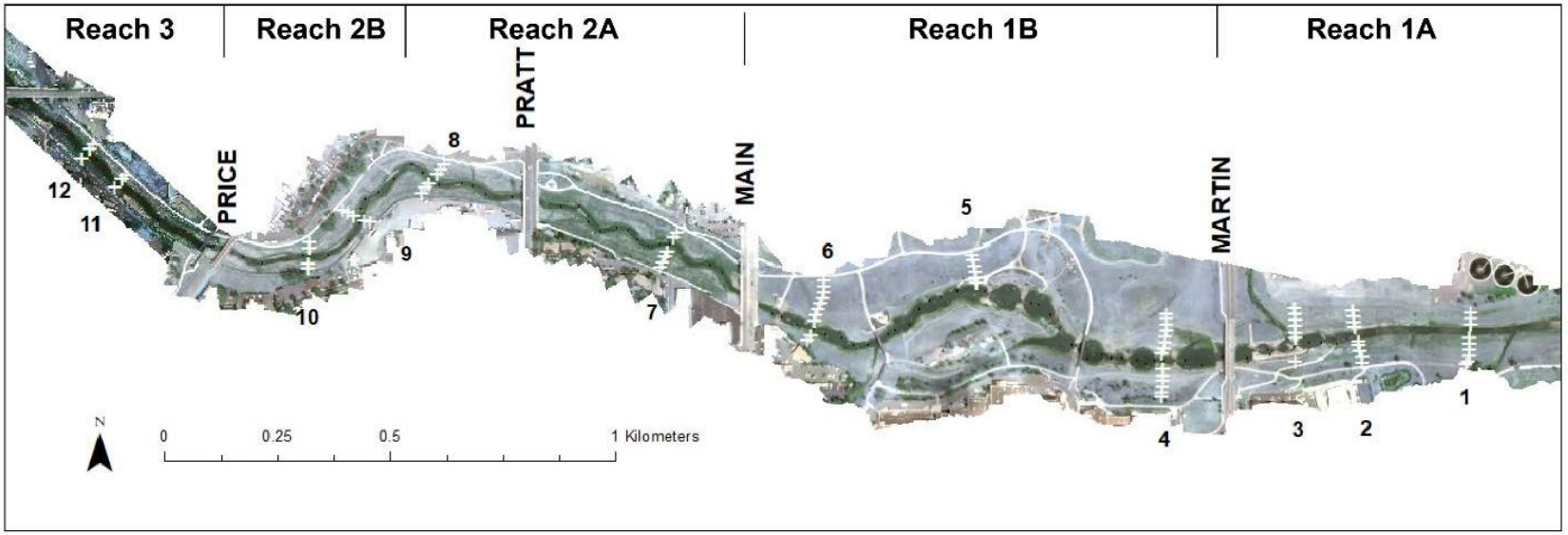
After Amlin and Rood (2002)

VEGETATION TYPE AND POSITION ARE INTERDEPENDENT



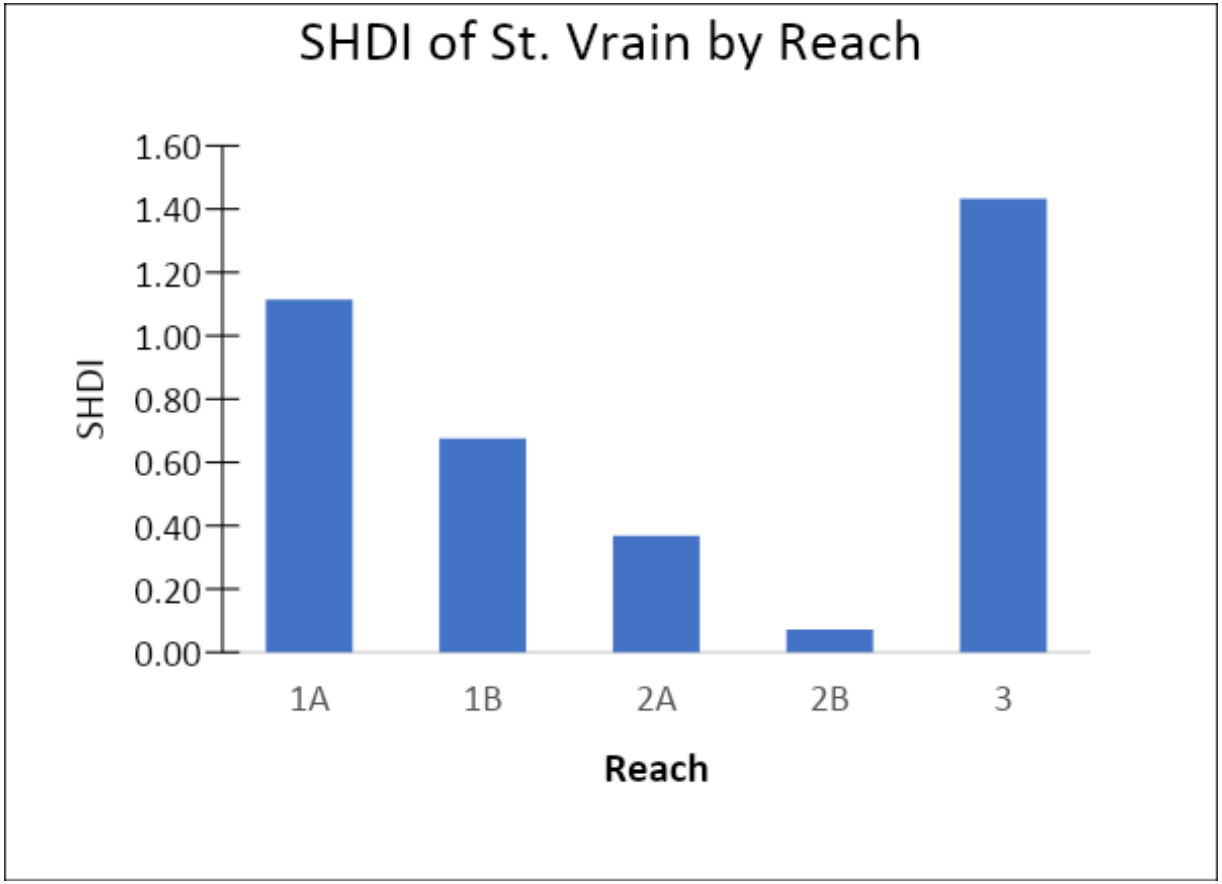
After Poff (1997); Courtesy Haylie Brown

VEGETATION SURVEYS



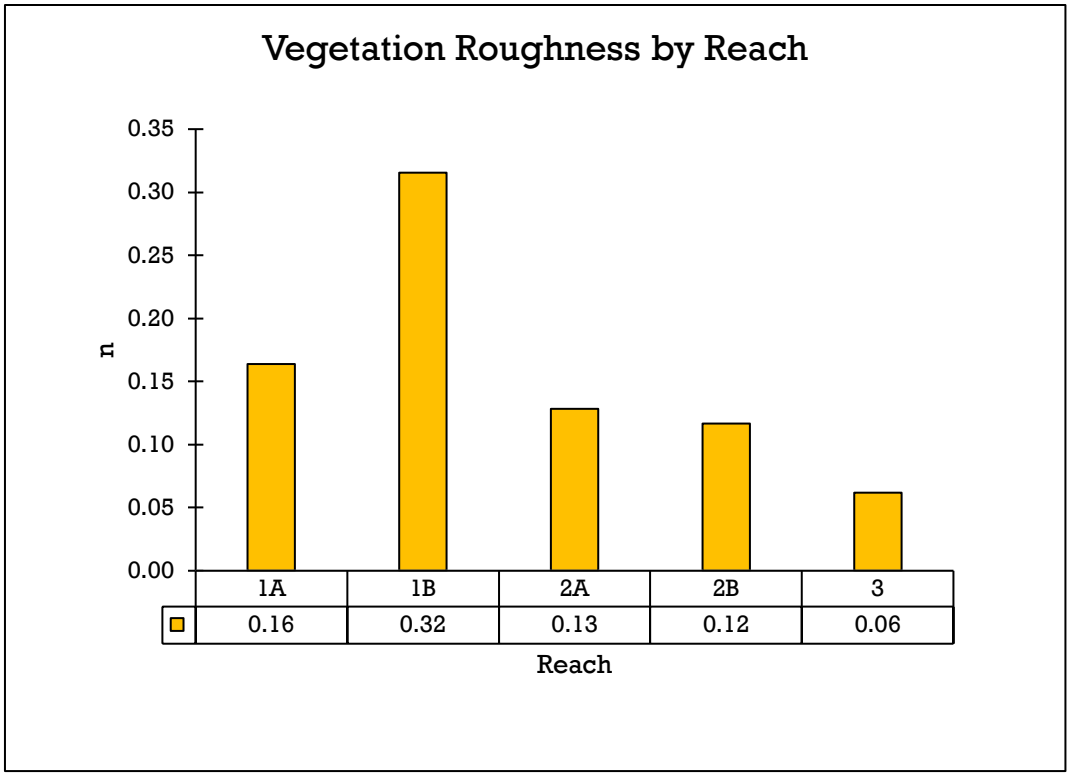

WINNING
NEVER
STOPS
UNC
CLUB SPORTS

VEGETATION DIVERSITY

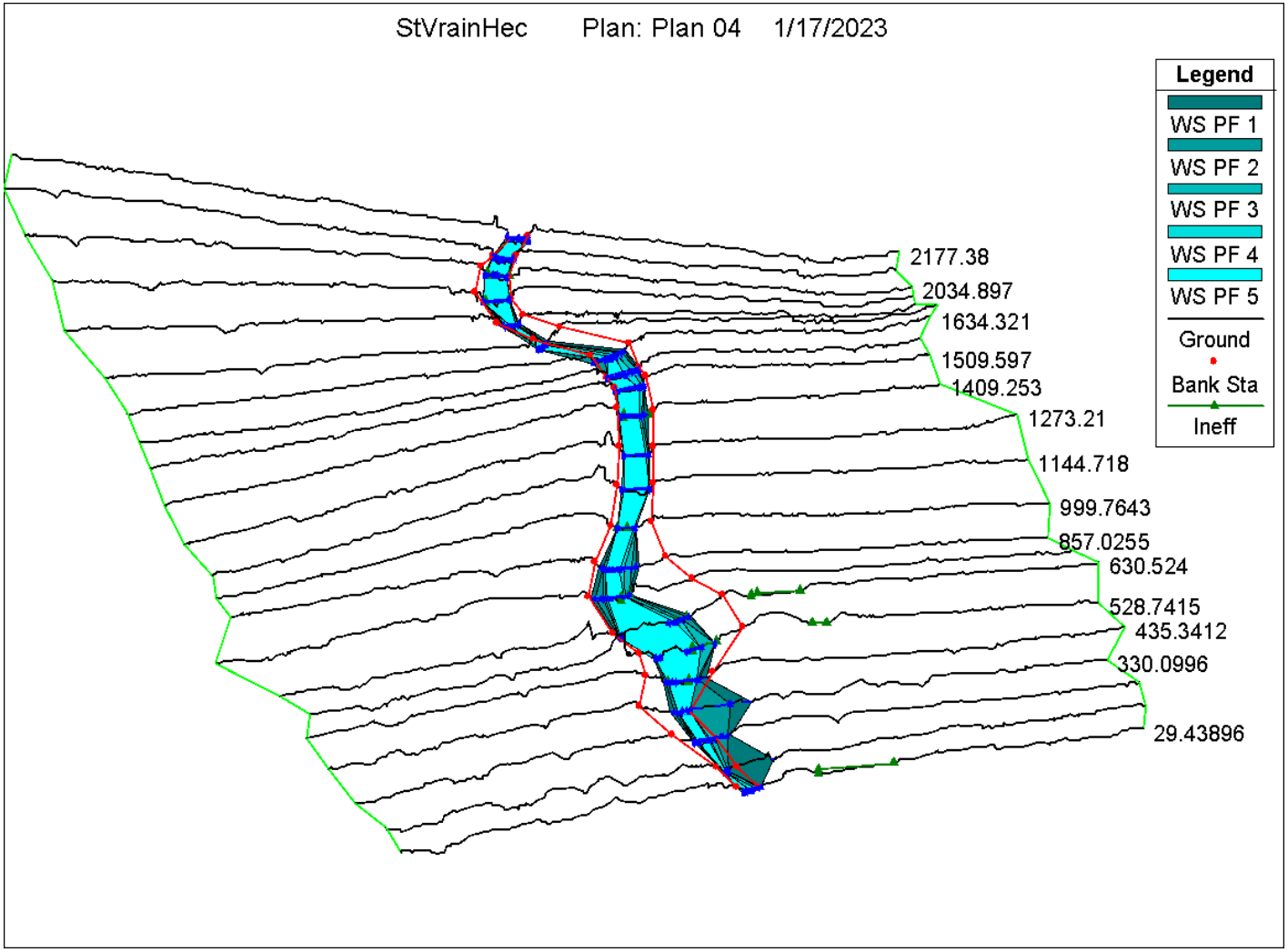


VEGETATION ROUGHNESS

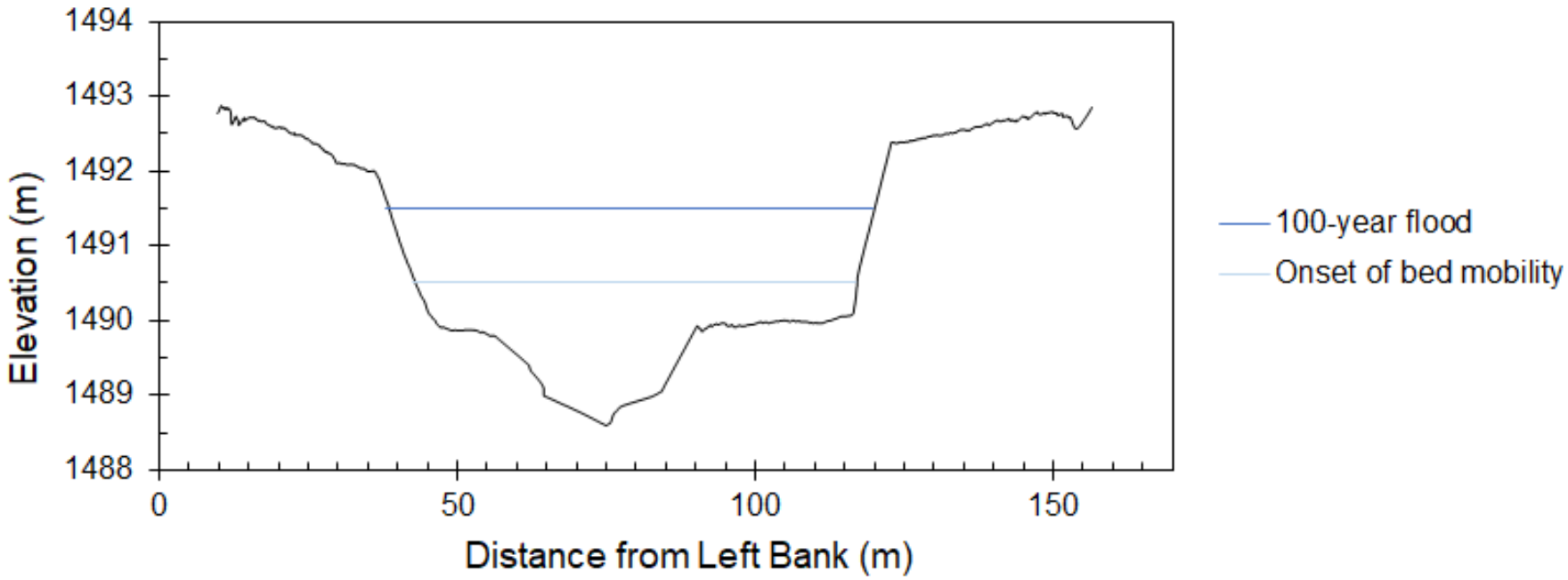
$$n_v = \sqrt{4C_D\left(\frac{A_p}{A}\right)\frac{y^{\frac{1}{3}}}{8g}}$$



HYDRAULIC MODELING



HYDRAULIC MODELING



LESSONS LEARNED

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- Incorporate geomorphologists and ecologists (interdisciplinary teams) early on in the planning phase
- Fit engineering to the constraints of the reach (don't over-engineer)
- Think strategically about revegetation strategies – take advantage of natural processes when possible

GENERAL RECOMMENDATIONS

- Effective restoration is process based and considers flow, sediment regime, and vegetation
- Take advantage of natural vegetation recruitment processes when possible, including maintaining seed banks and encouraging natural recruitment and succession
- We need interdisciplinary teams, including social scientists, to solve these management issues

THANK YOU