RIVER CORRIDORS / FLOODPLAINS

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Doug Denu

Sediment Regimes of Vermont Rivers

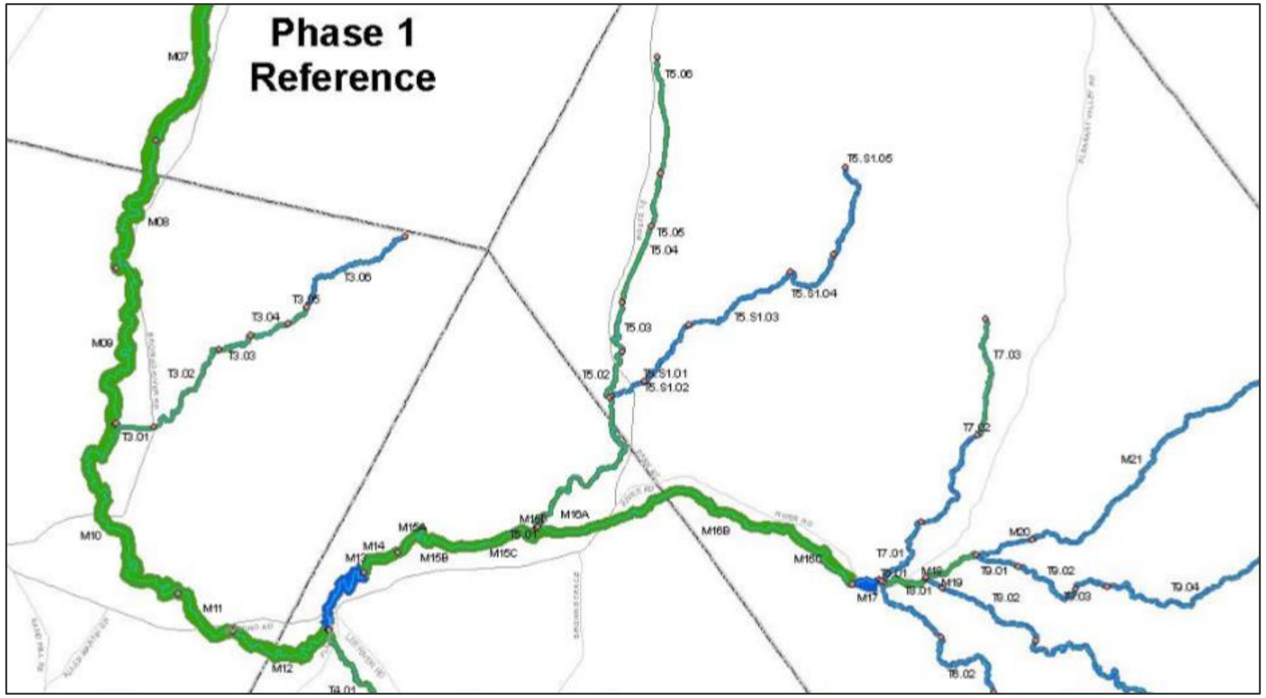
(e.g. floodplain encroachment)

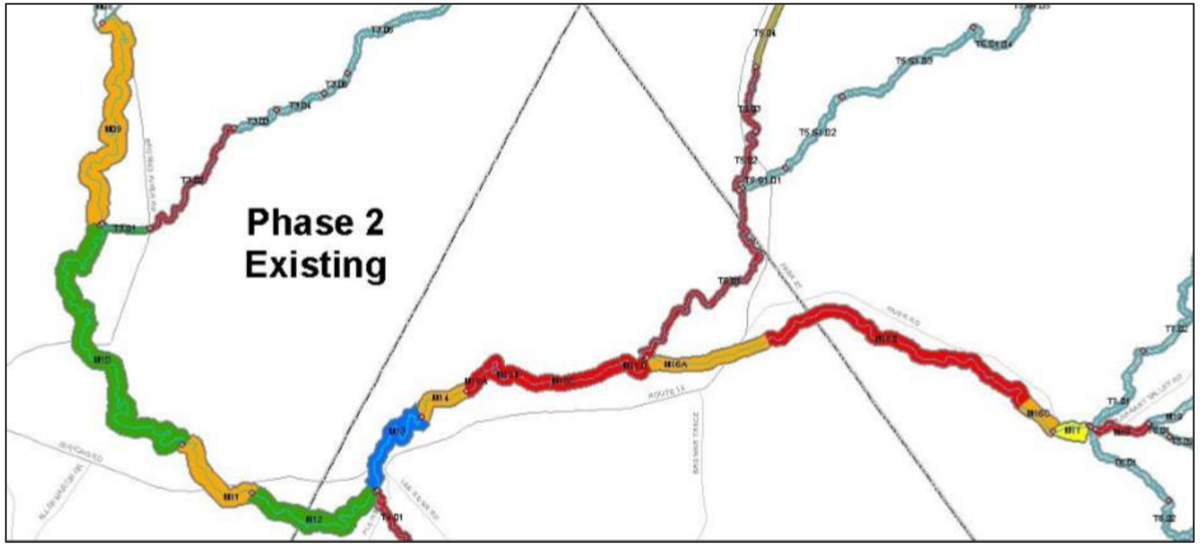
Reference “Ideal” condition

Current condition

Interventions

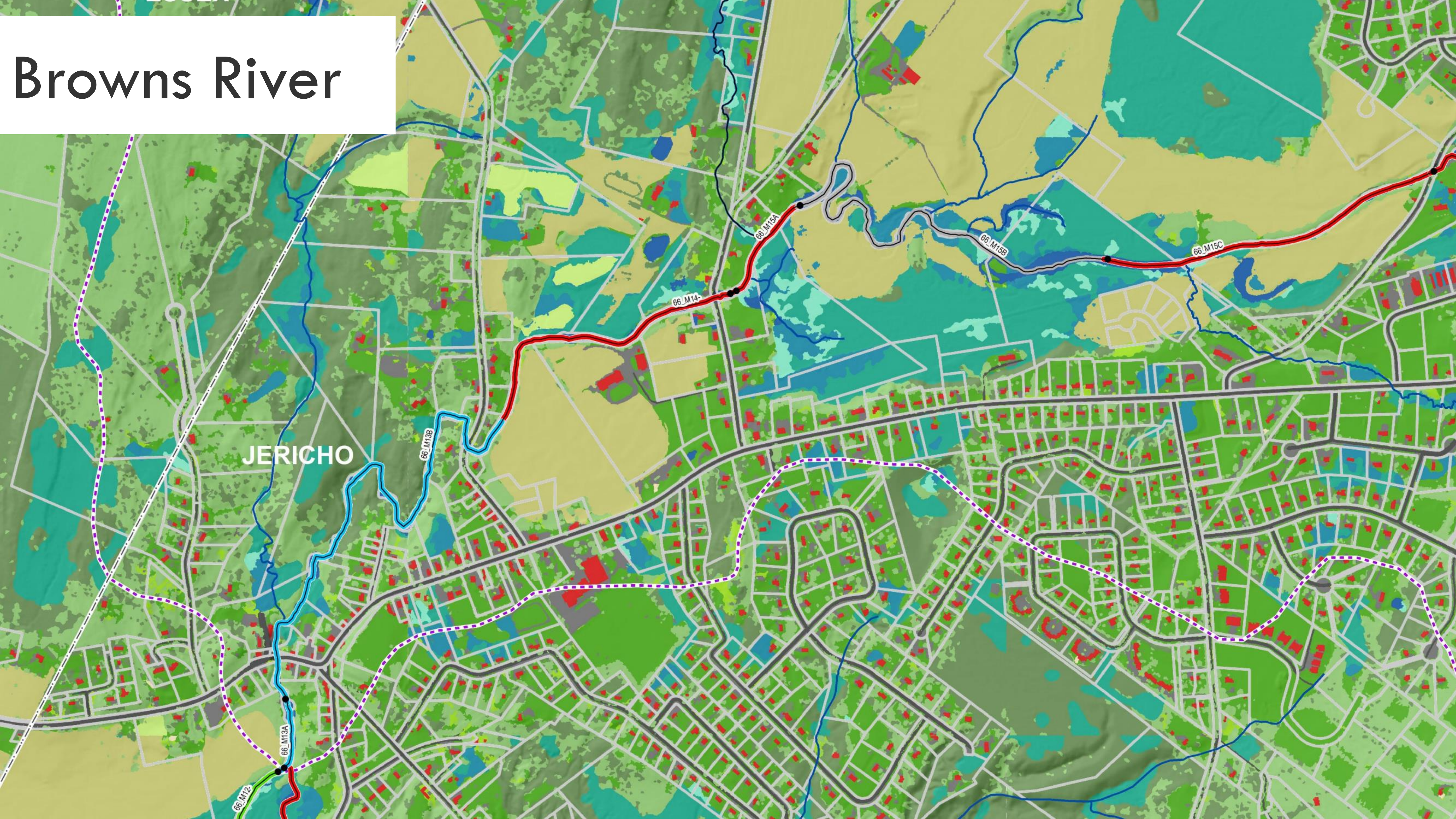
(e.g. conservation)



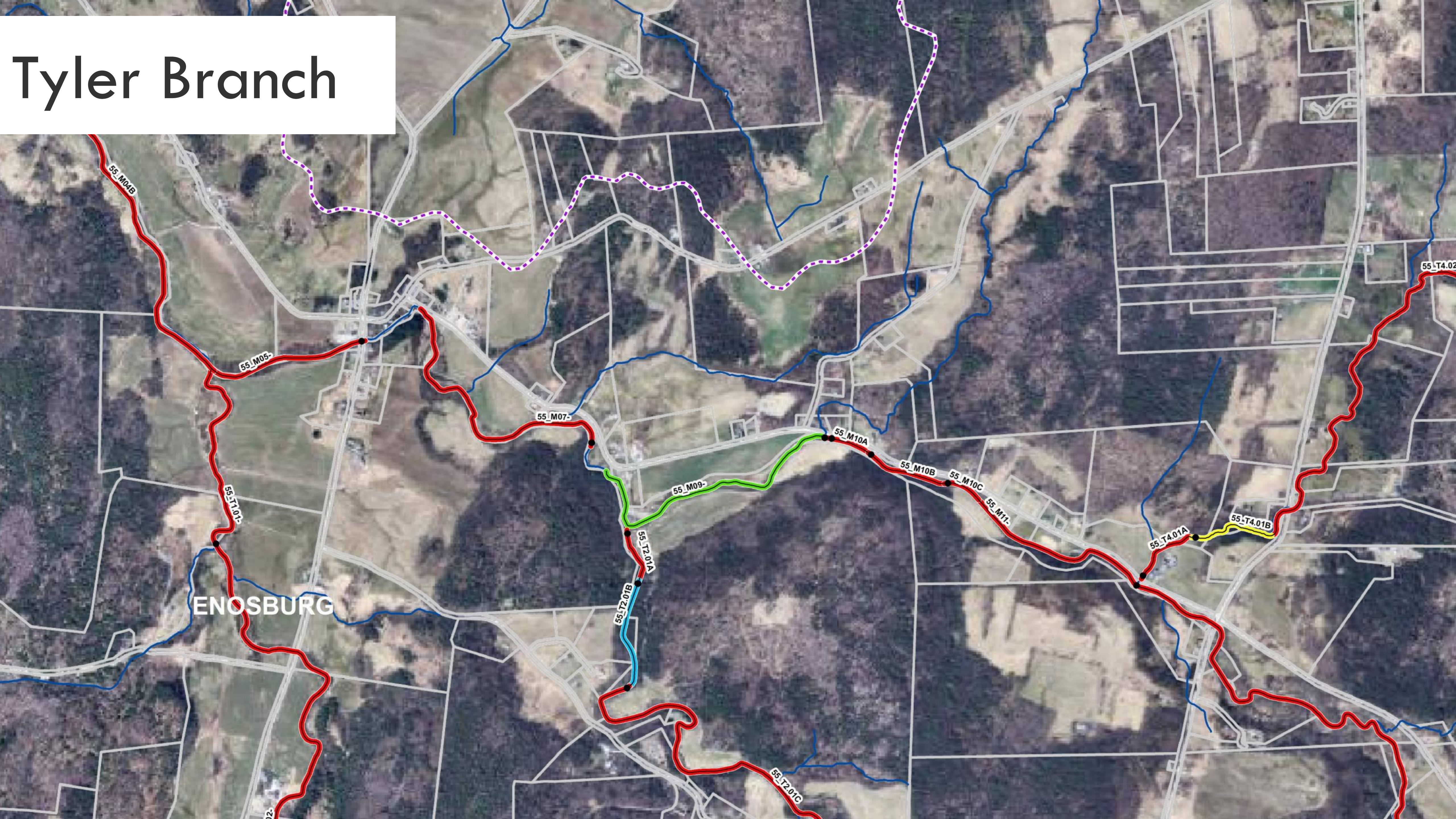


Kline, M. 2010. Vermont ANR River Corridor Planning Guide: to Identify and Develop River Corridor Protection and Restoration Projects, 2nd edition. Vermont Agency of Natural Resources. Waterbury, Vermont.

Browns River

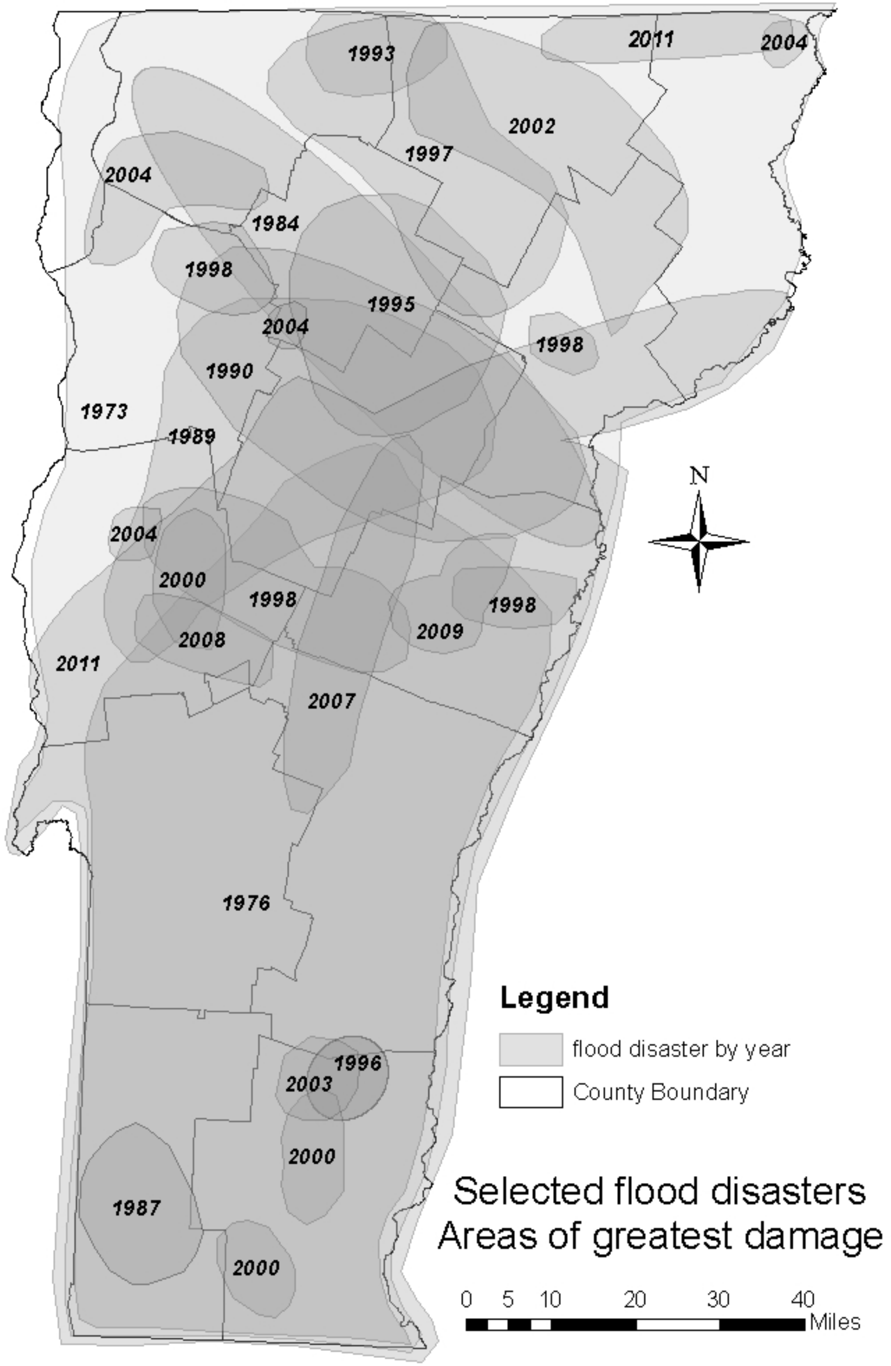


Tyler Branch



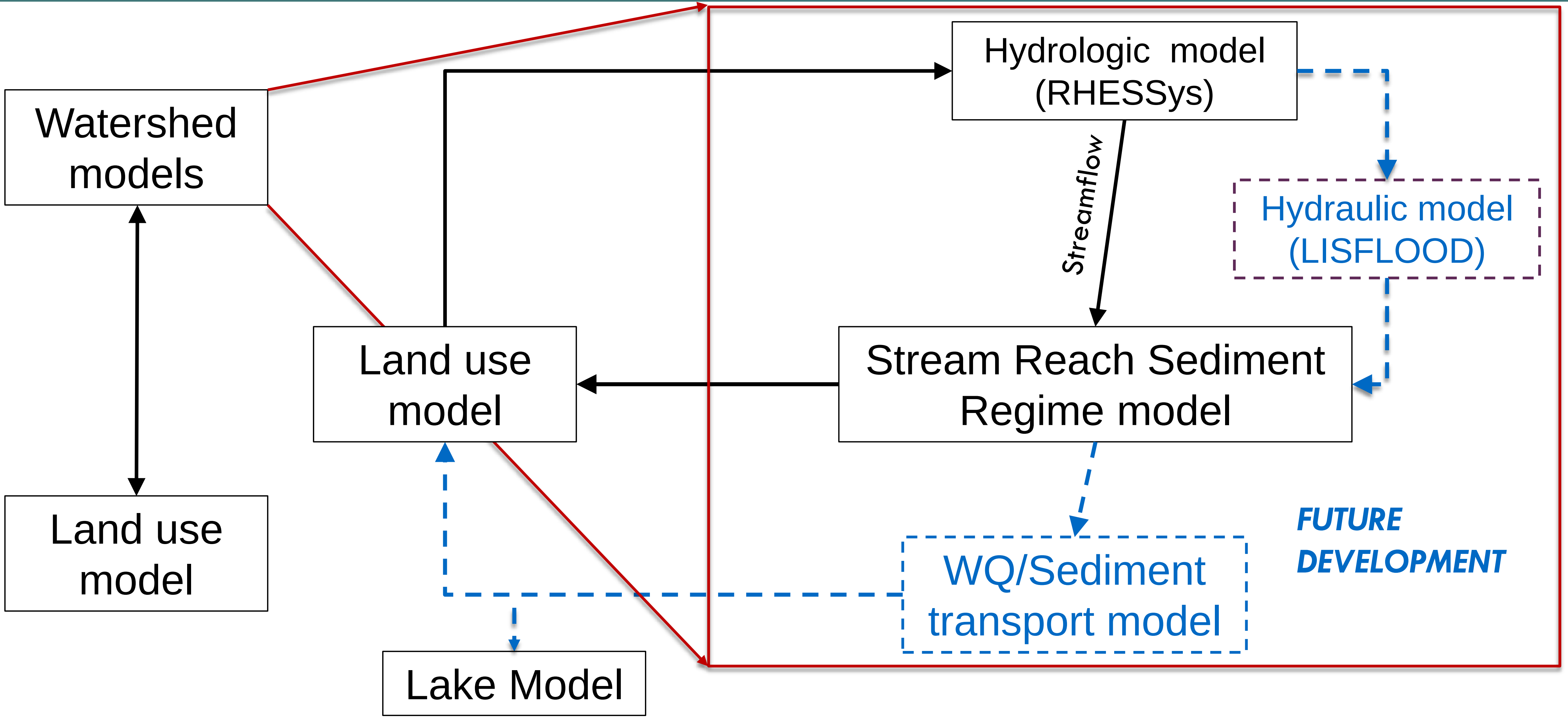
An Increasing Risk of Flooding in Vermont

- Expected increase in streamflows
- Historical development along river corridors



Map by Ben Copans and Barry Cahoon

Expanding modeling of river corridors and sediment in the IAM



Sediment Transport Regime Prediction

- Most interested in identifying regimes, where restoration / conservation could most effectively support a return to the natural regime

Valley Confinement	Sediment Transport Regime	Slope	Valley Confinement Ratio	Incision Ratio	Entrenchment Ratio	Width/Depth Ratio
Confined	Transport	≥ 2 %	< 6	< 1.3	< 1.4 (< 2.2)	< 12 (A, G) > 12 (F, B)
Confined Partly Confined	Confined Source & Transport	≥ 2 %	< 6 ≥ 1	> 1.3	< 1.4 (< 2.2)	< 12 (A, G) > 12 (F, B)
Unconfined	Unconfined Source & Transport	< 4 %	≥ 4	> 1.3	< 1.4 (< 2.2) > 2.2	< 30 < 12 (E)
Unconfined	Fine Source & Transport and Coarse Deposition	< 2 %	≥ 4	> 1.3	> 2.2	> 30 (B, C) > 12 (E) > 40 (D)
Unconfined	Coarse Equilibrium & Fine Deposition	< 2 %	≥ 4	< 1.3	> 2.2	< 30 (C) < 12 (E)
Unconfined	Deposition	< 2 % > 1 %	≥ 6	1.0	> 2.2	> 30 > 40

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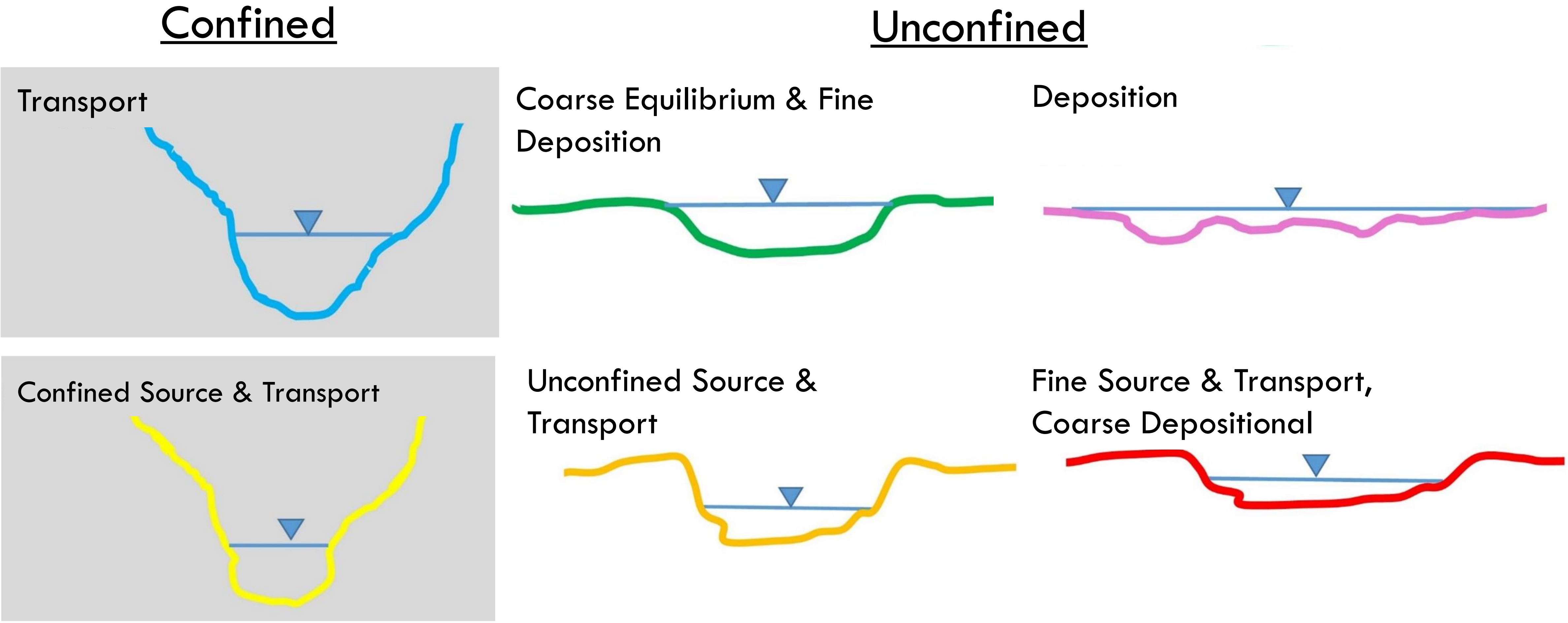
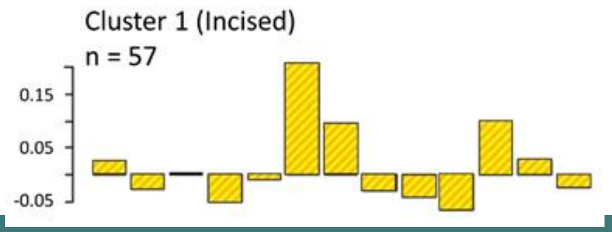
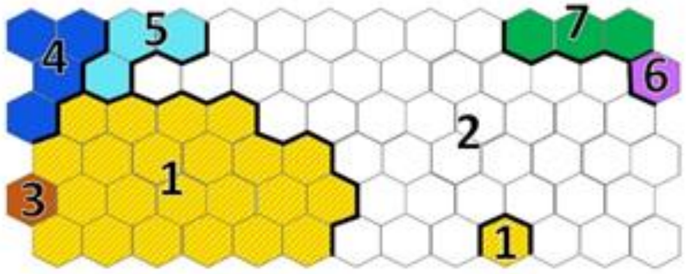


Underwood, et al., 2018 (in preparation)

Stream Reach Sediment Regime Model

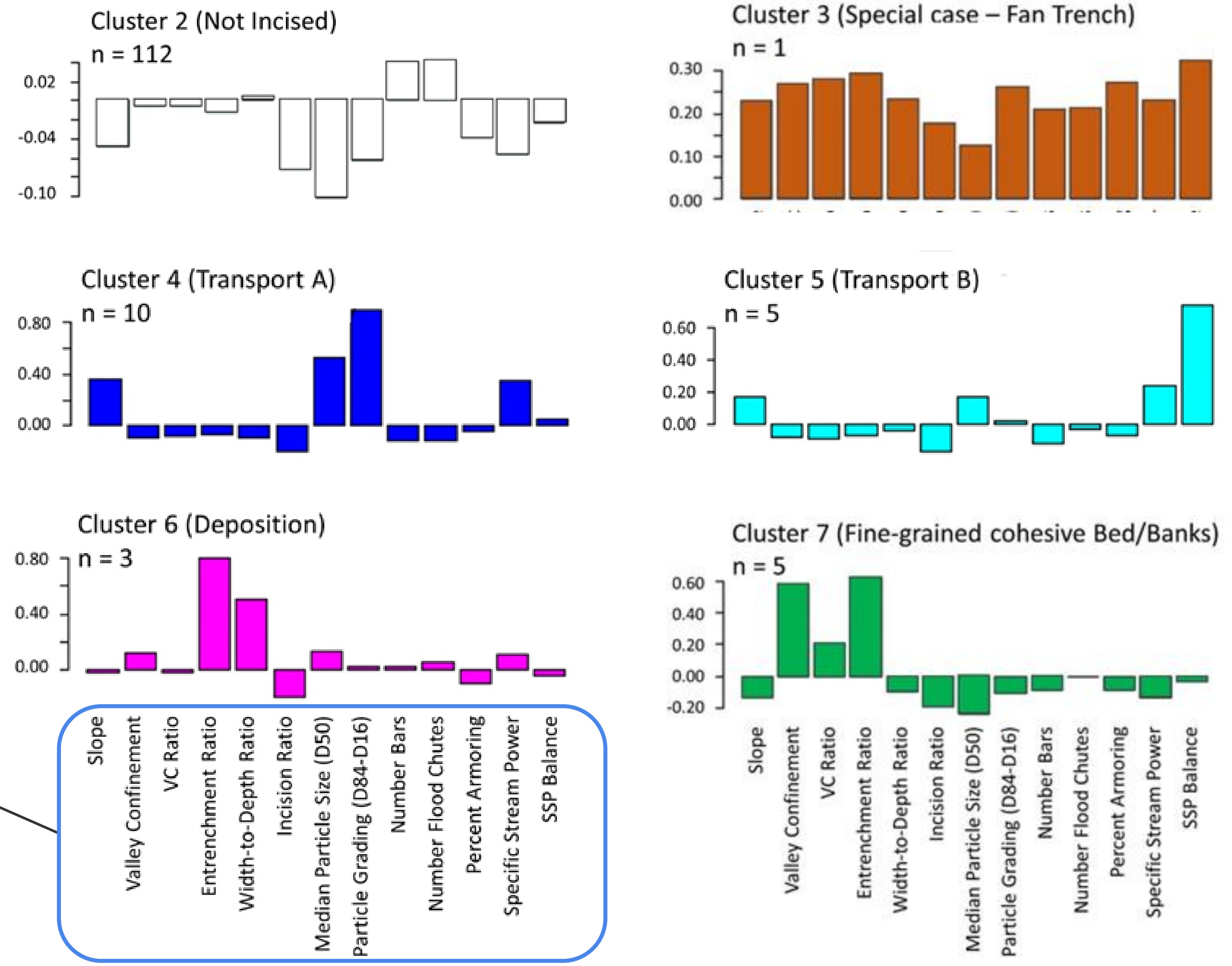


- Self-Organizing Map (SOM) clustering based predictor



Data Inputs :

- Slope
- Valley Confinement
- Streampower
- Width-to-Depth Ratio
- Incision Ratio
- etc…



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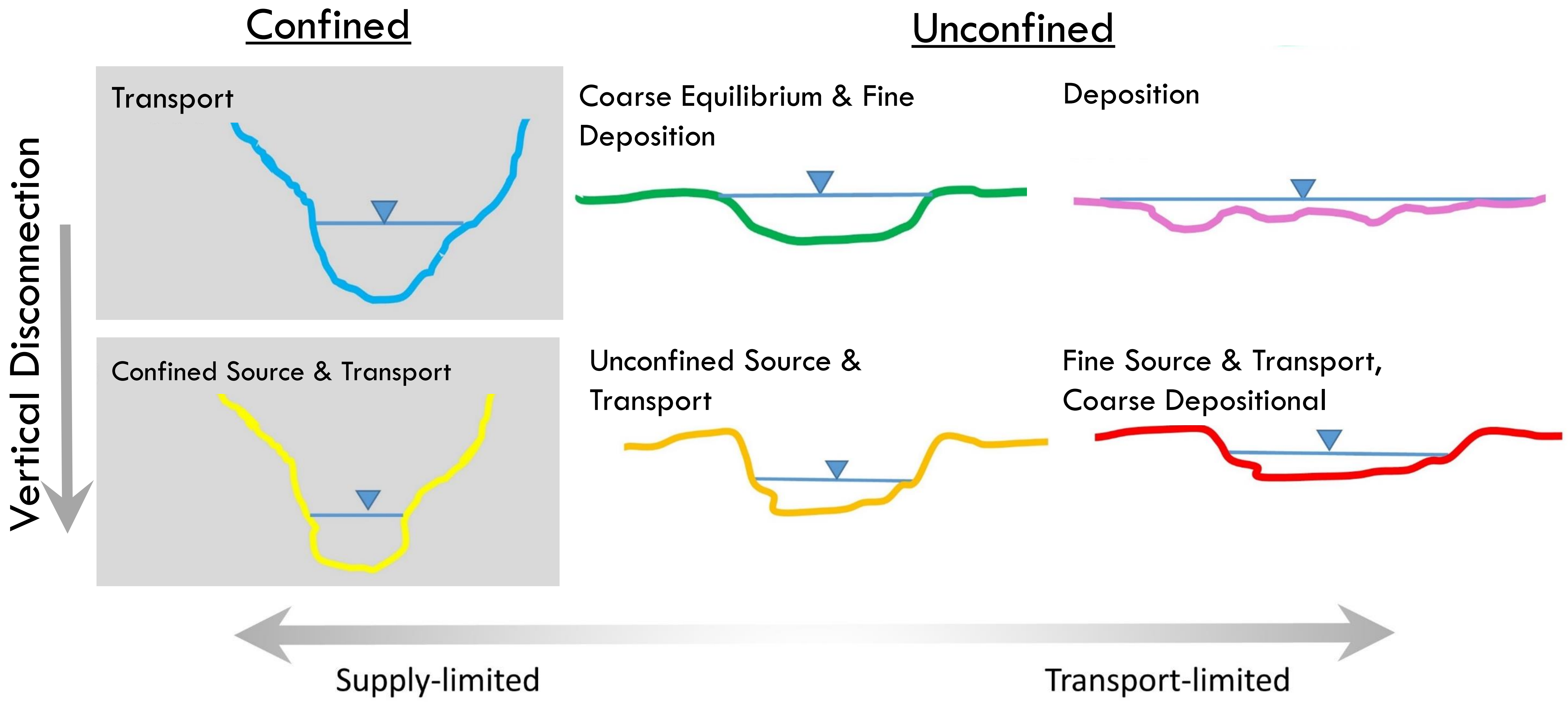

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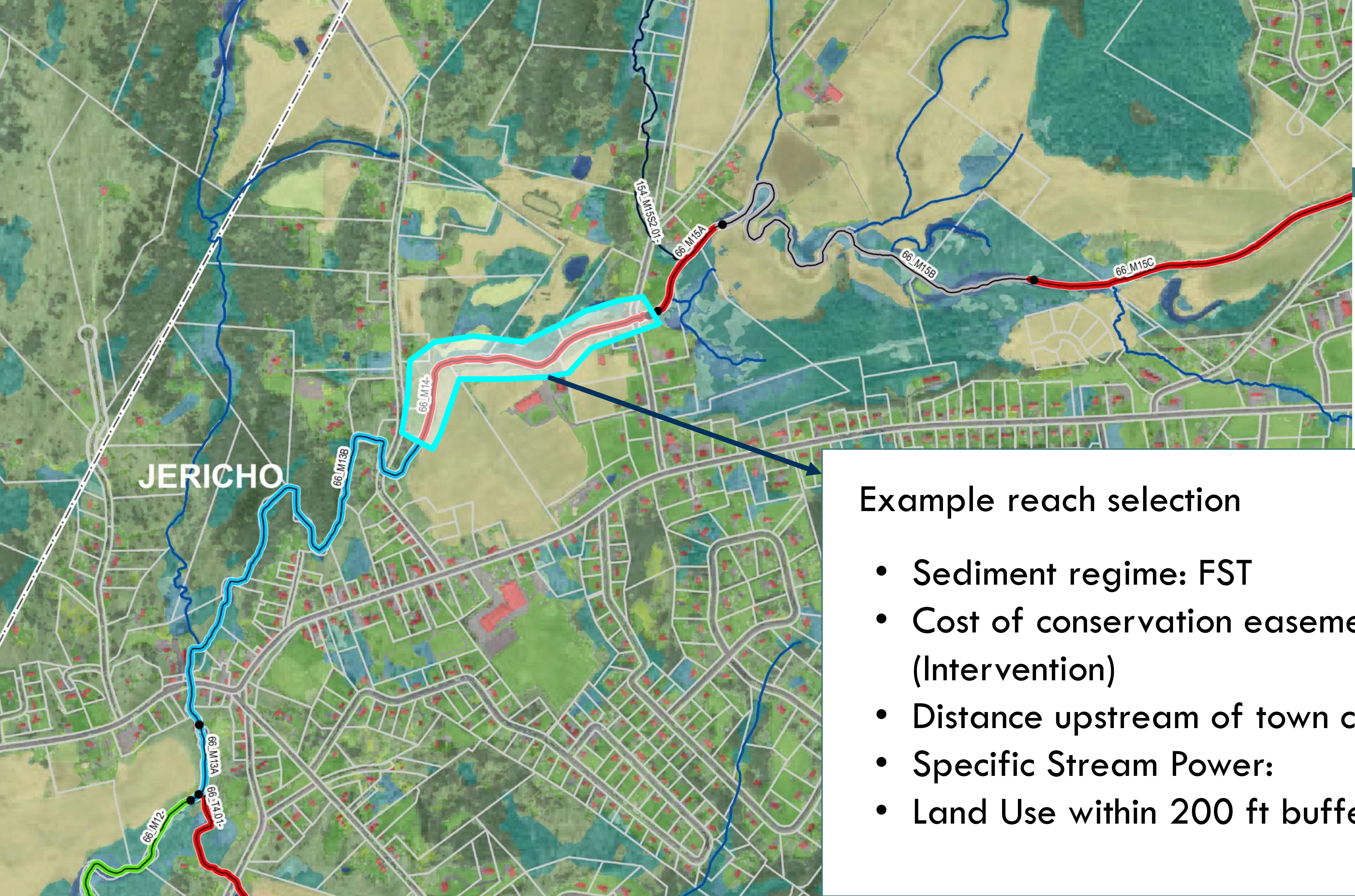
Scenario: Protection of limited number of reaches

- Optimization model allows analysis of possibilities
- What factors to weight in prioritization of reaches?

Example Objective Function	How to weight?
Sediment Regime Type	0.2
Distance upstream from communities	0.2
Streampower	0.2
Cost	0.2
Land Use along reach	0.2
	1.0

Interventions →

Affects Optimization Results & Weighting

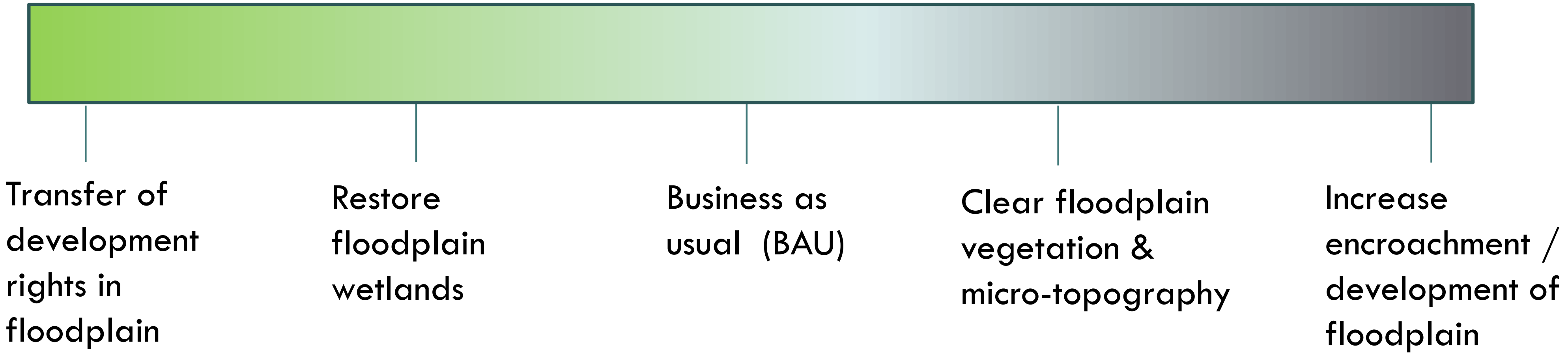


Example reach selection

- Sediment regime: FST
- Cost of conservation easement (Intervention)
- Distance upstream of town center
- Specific Stream Power:
- Land Use within 200 ft buffer:

An example intervention/change gradient

Floodplain Function Gradient



An example intervention/change gradient

Channel Stability Gradient