Hydrolytics

Woodard & Curran

C2VSimCG Delta Update

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CWEMF

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Acknowledgements

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  - Tariq Kadir, Can Dogrul, Norman Johns, Steven Jepsen
- Woodard and Curran
  - Ali Taghavi, Mesut Cayar, Sara Miller
- Hydrofocus
  - Steve Deverel

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C2VSimCG Delta Update

- Delta Hydrology
- Surface Water Routing and Flow
- Ground Surface Elevation, Layering and Drains
- Island Diversions, Seepage and Drainage
- Updated Model Performance

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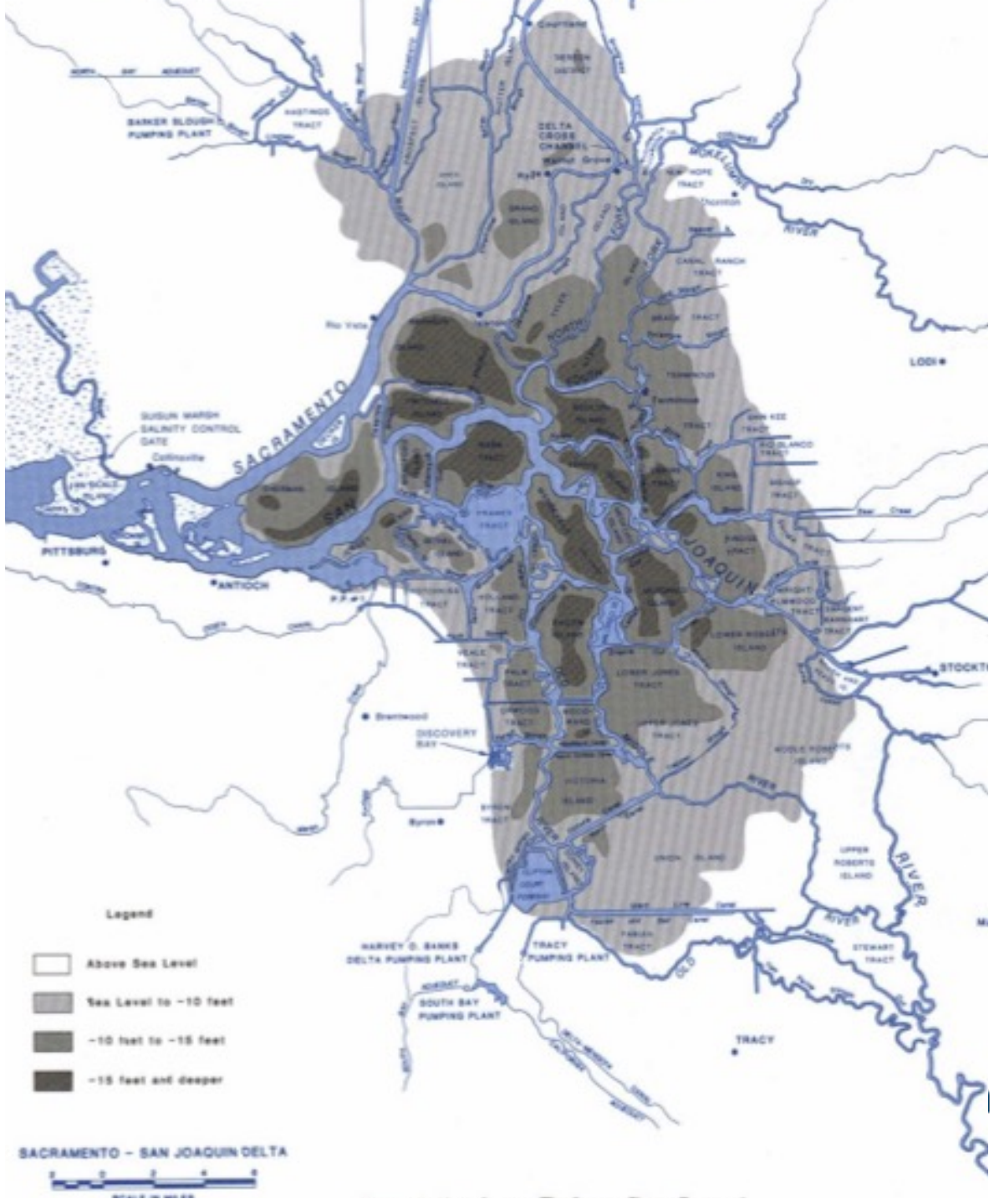
Delta Hydrology

- Multiple channels
- Complex channel flows
- Large area with GSE below 0 ft
- Peat and clay soils
- Upward groundwater gradient
- Tile drains



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Delta Hydrology

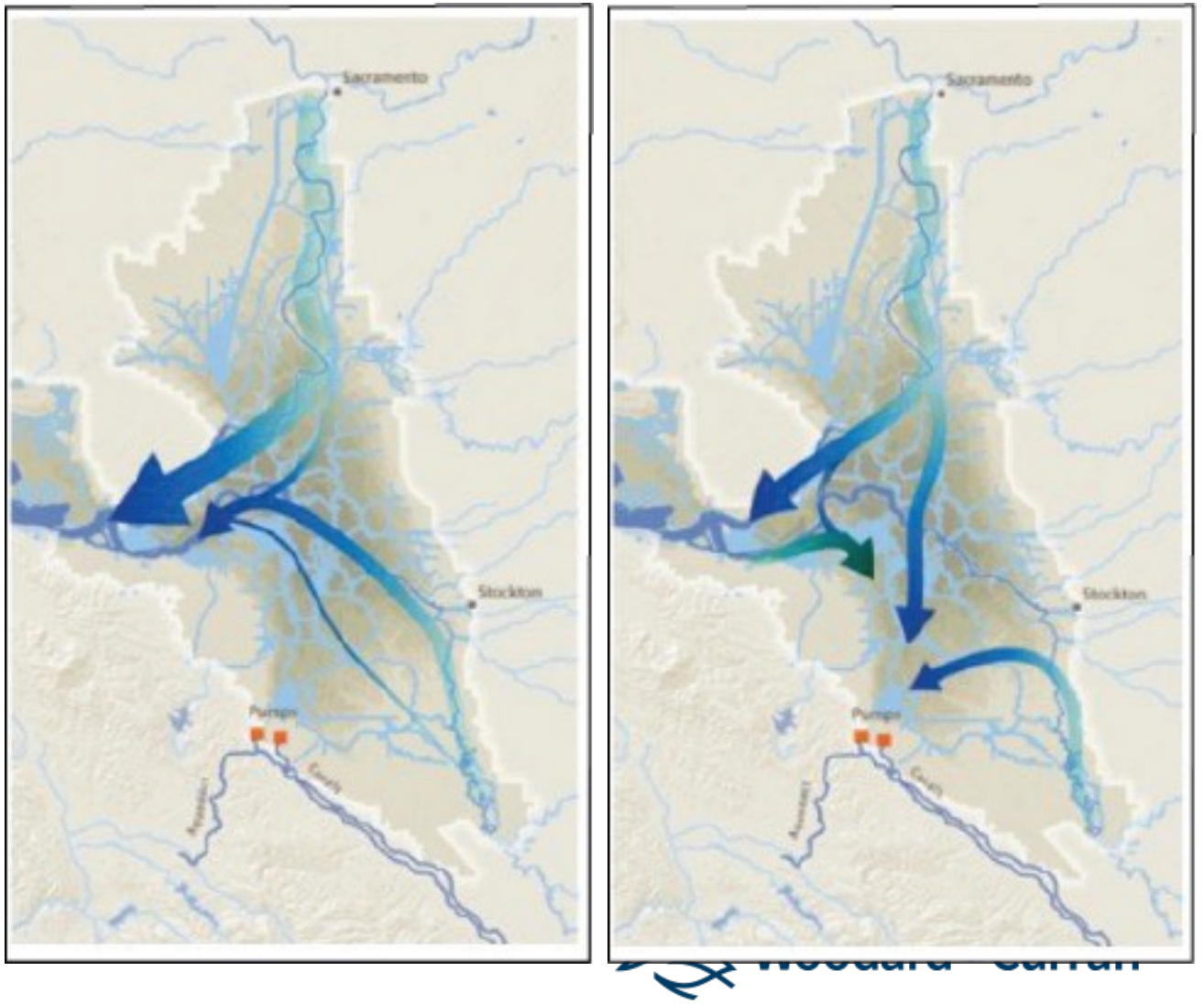
	Central Valley	Delta
River Flow	One Way	Multiple Paths
Ground Surface	Above Water Level	Below Water Level
Soils	Sand, Loam, Clay	Peat over Clay
Hydraulic Gradient	Downward	Upward
Tile Drains	Rare	Dominant

C2VSimCG Modifications

- Delta Rivers

Surface Water Routing

- Original model could simulate no-pumping flows
- Add channels & bypasses to model pumping flows



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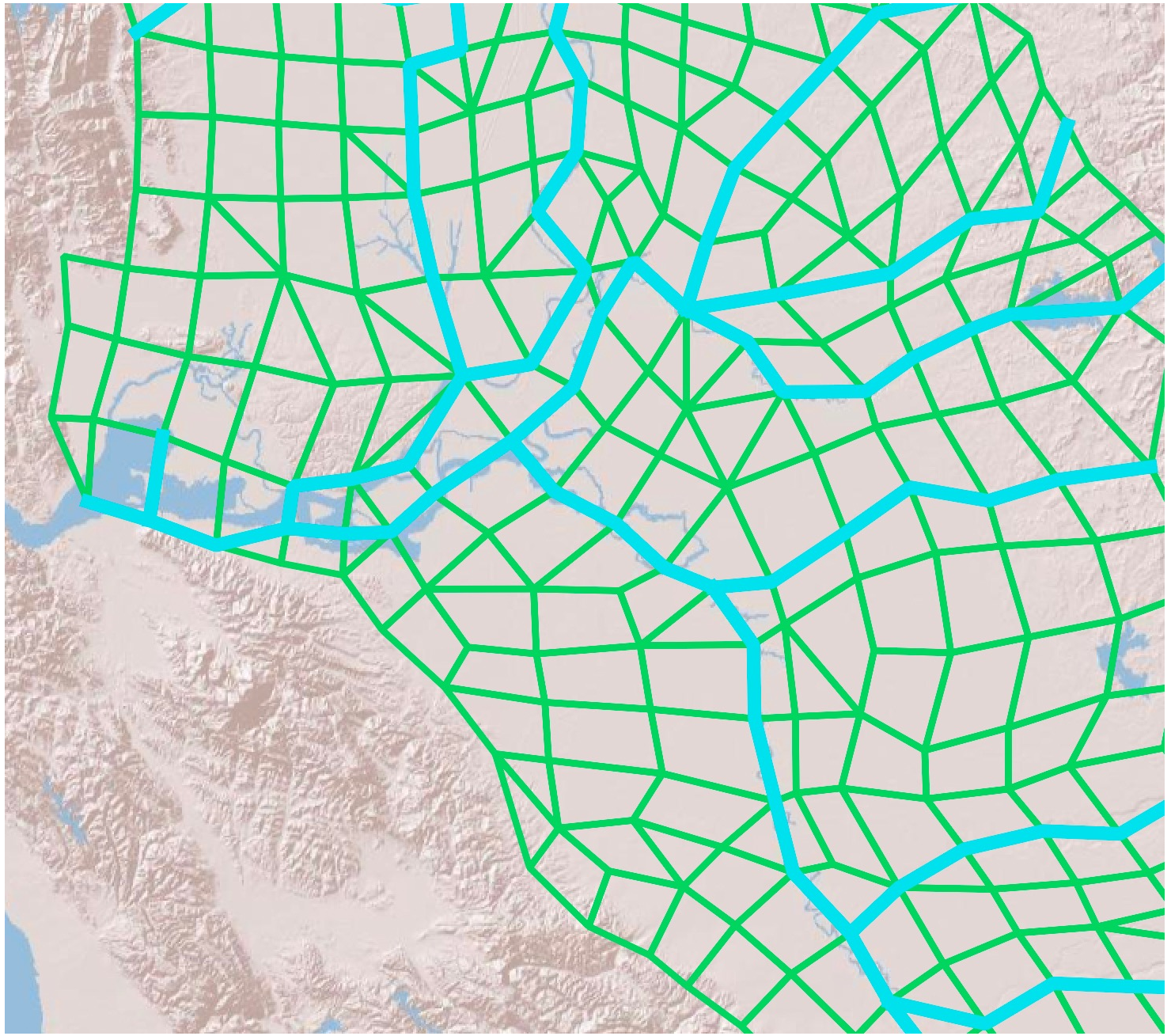
Original Rivers



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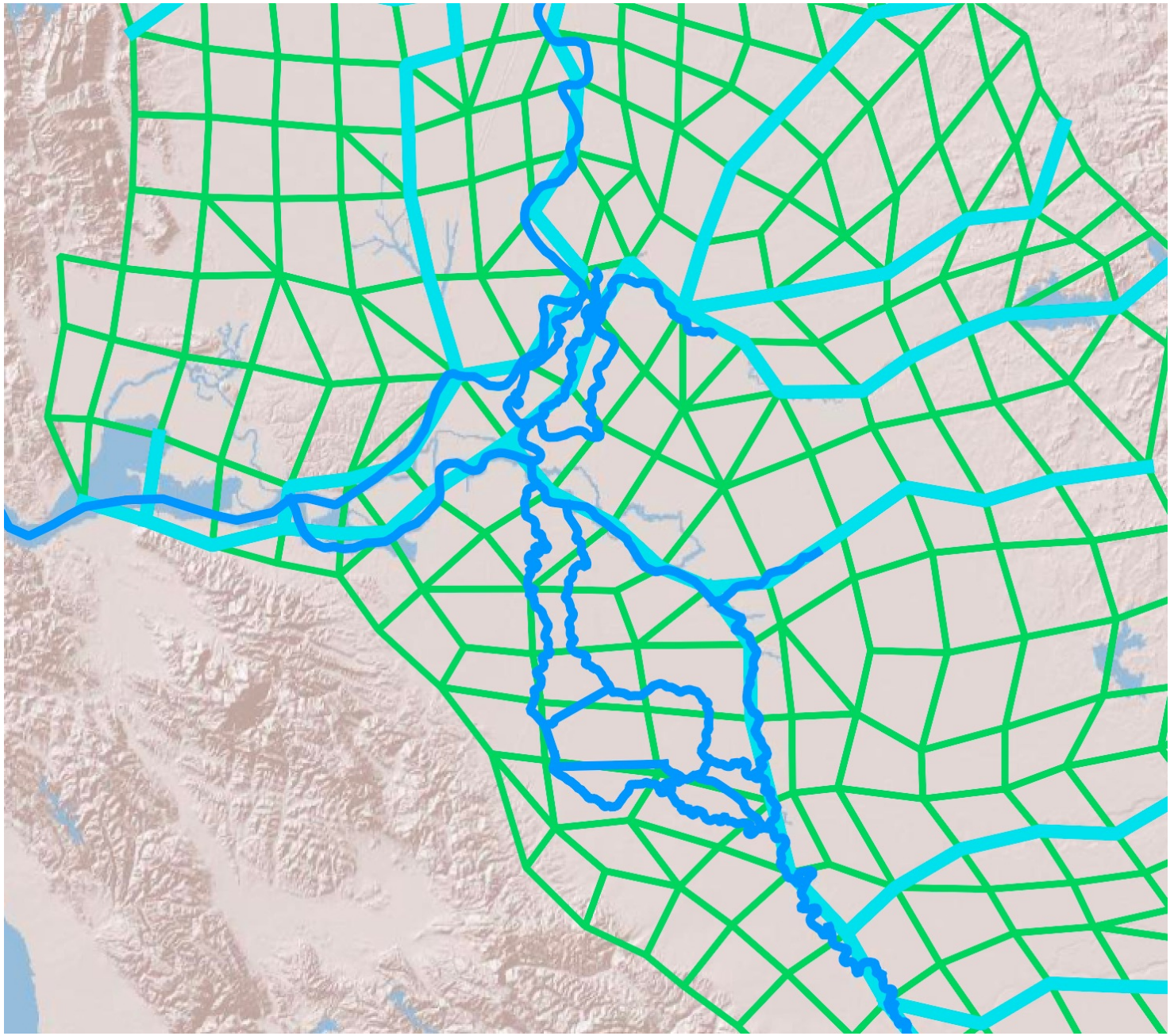
Actual Rivers



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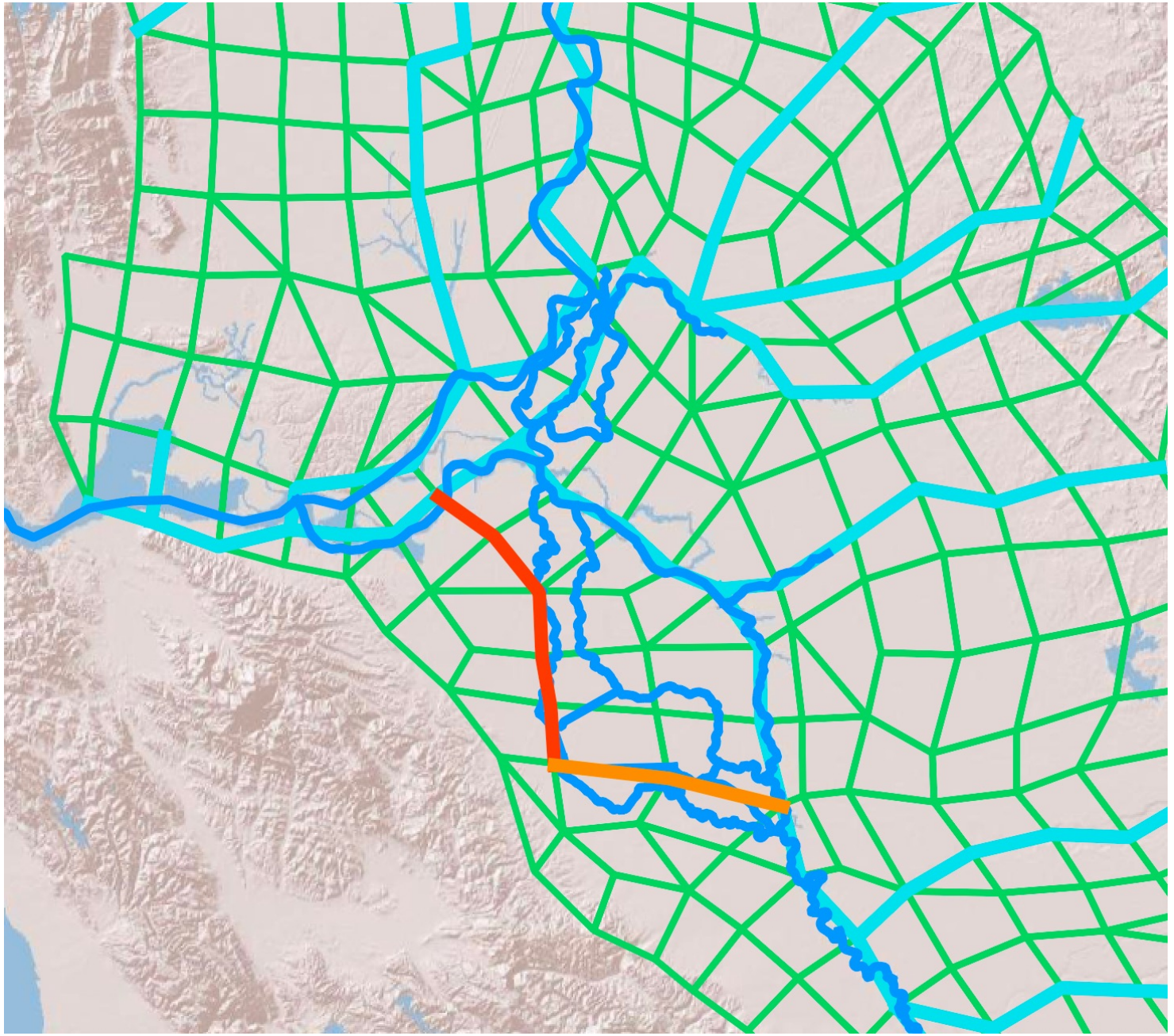
Updated Rivers



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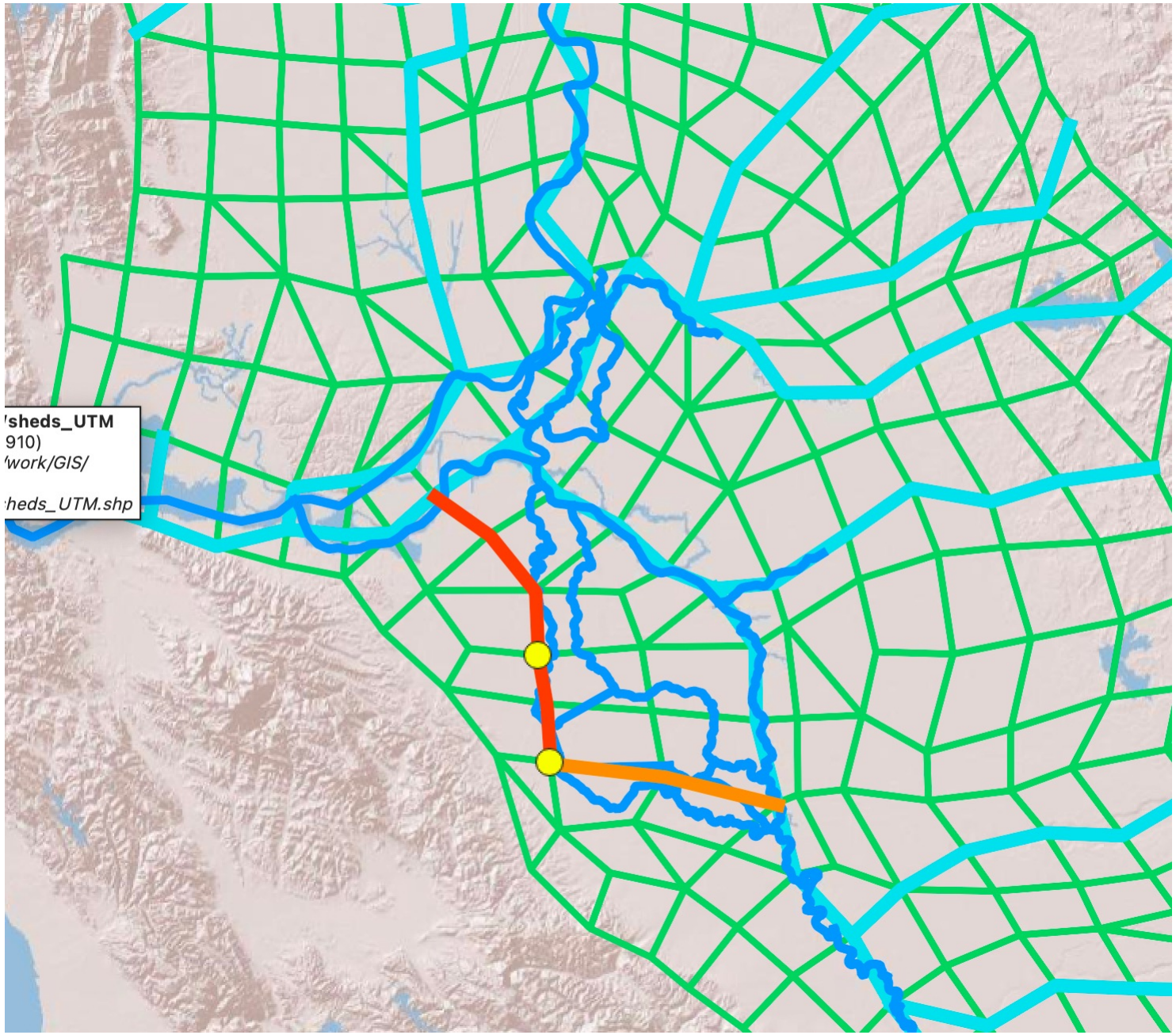
Diversion Points



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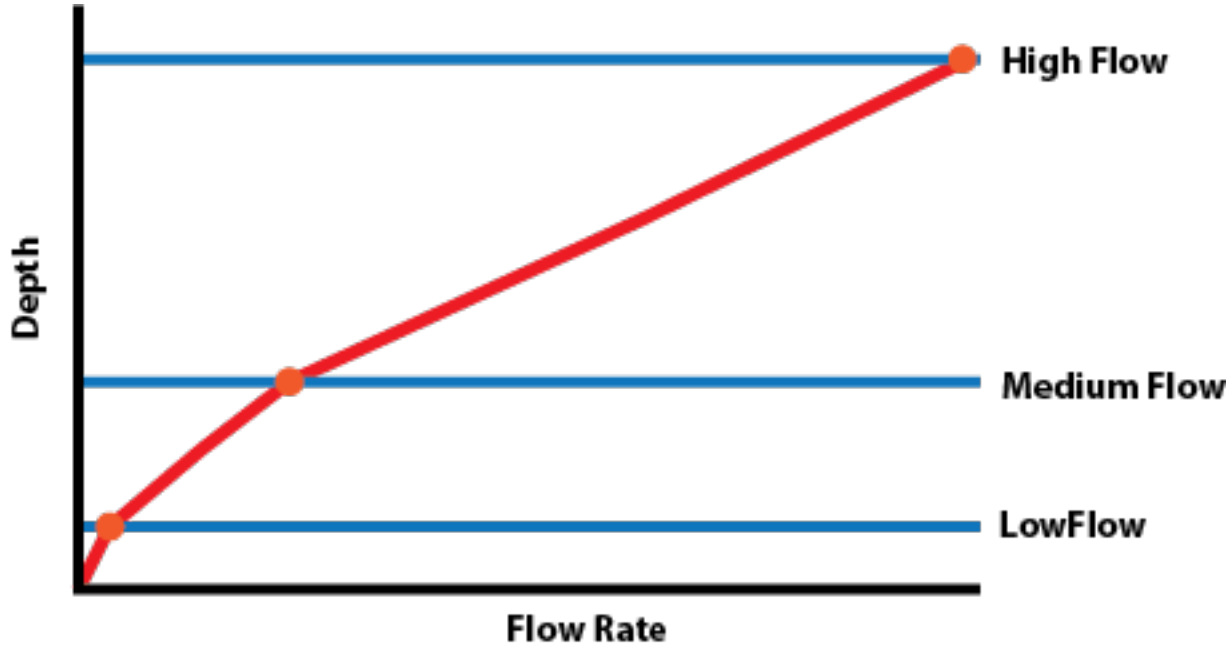
C2VSimCG Modification

- Delta Rivers
- Stream Rating Tables

Stream Rating Tables

- Adjust stream node rating tables for stream bottom below sea level
- If stream bed below sea level:
  - Q = 0 -> H = stream bed
  - Q = 1 -> H = 0
  - Water surface always at or above Sea Level



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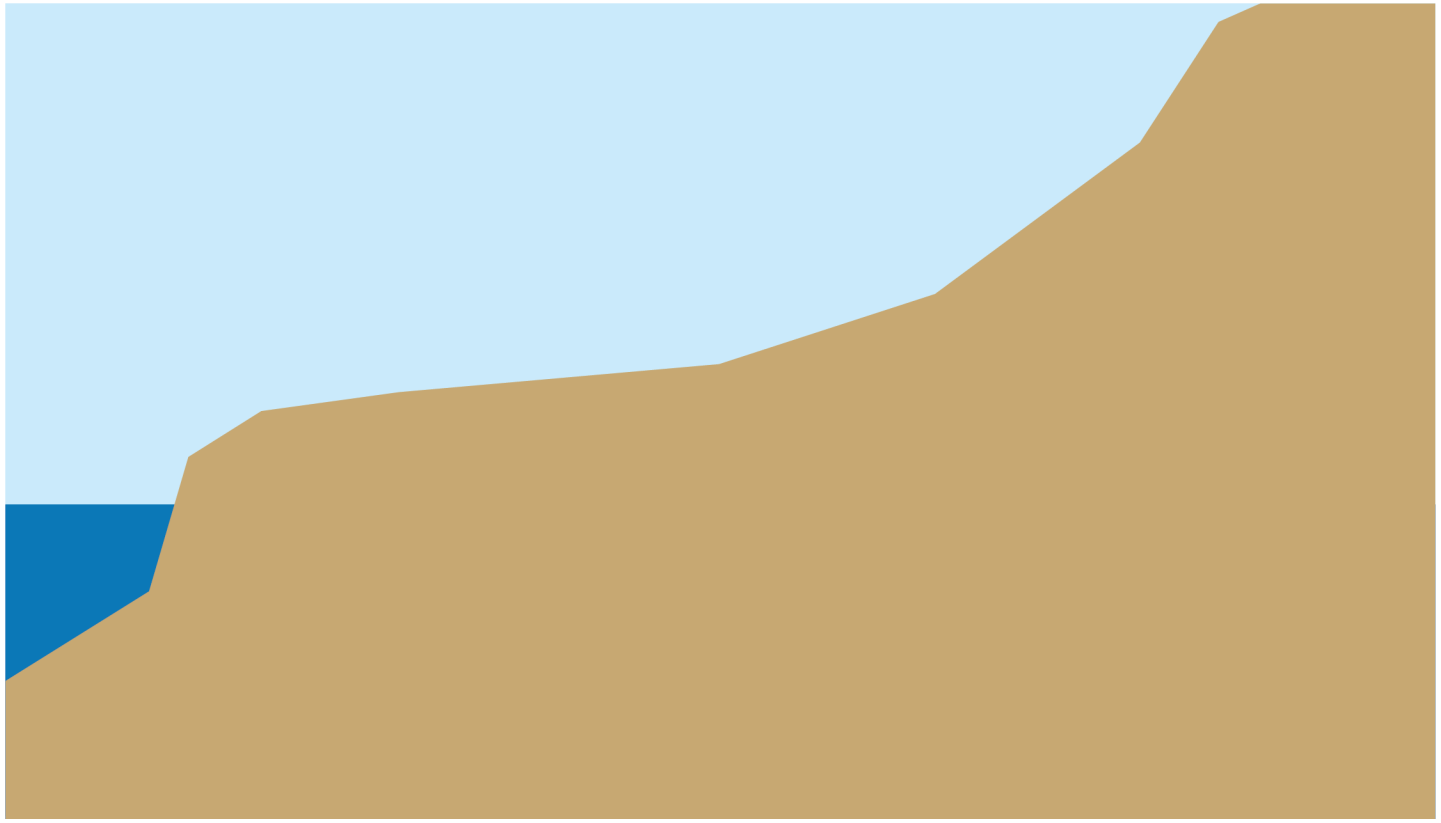
C2VSimCG Modification

- Delta Rivers
- Stream Rating Tables
- Ground Surface Elevation, Layering and Drains

Delta Formation

6,000 years ago



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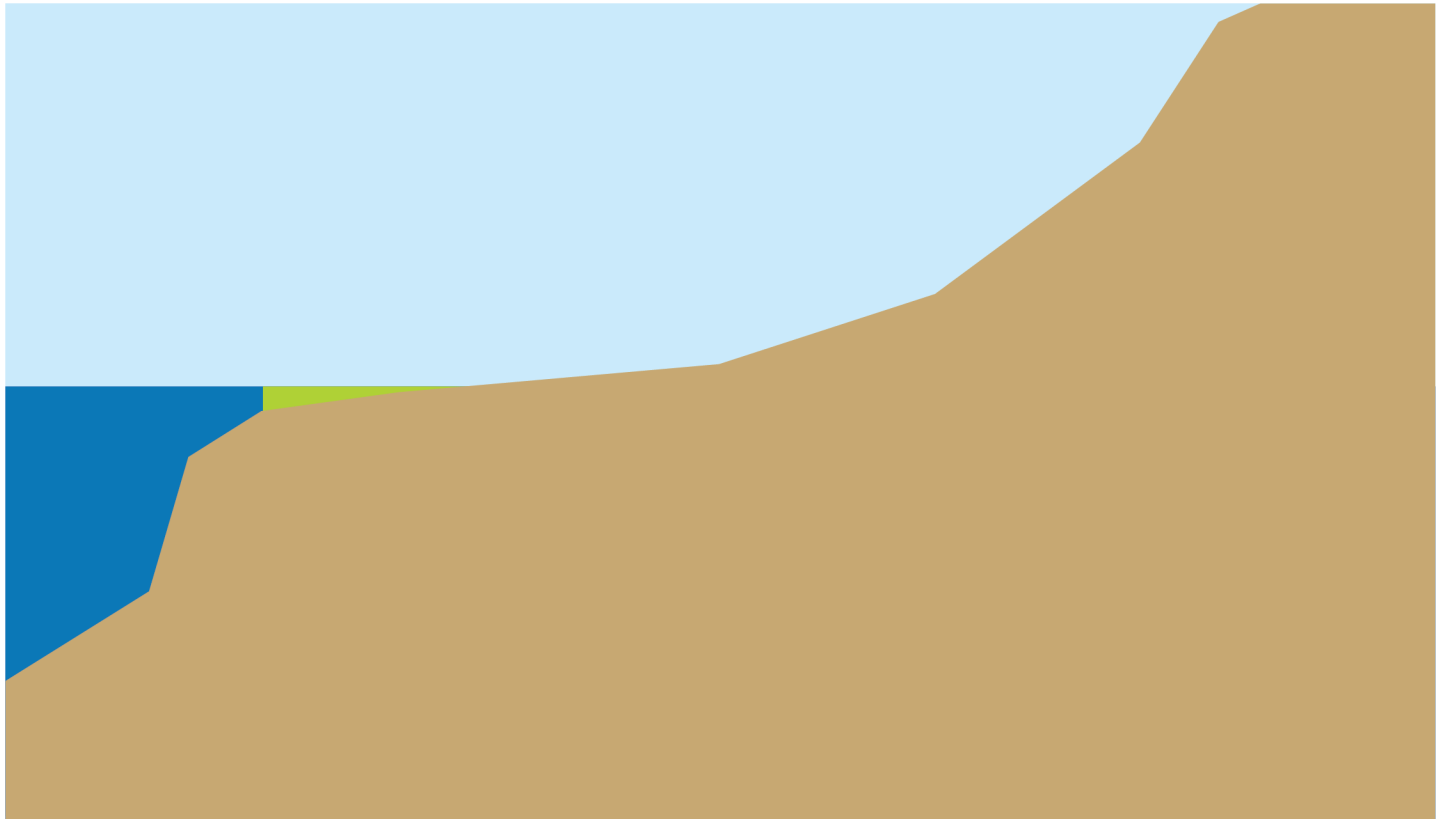
Delta Formation

4,000 years ago



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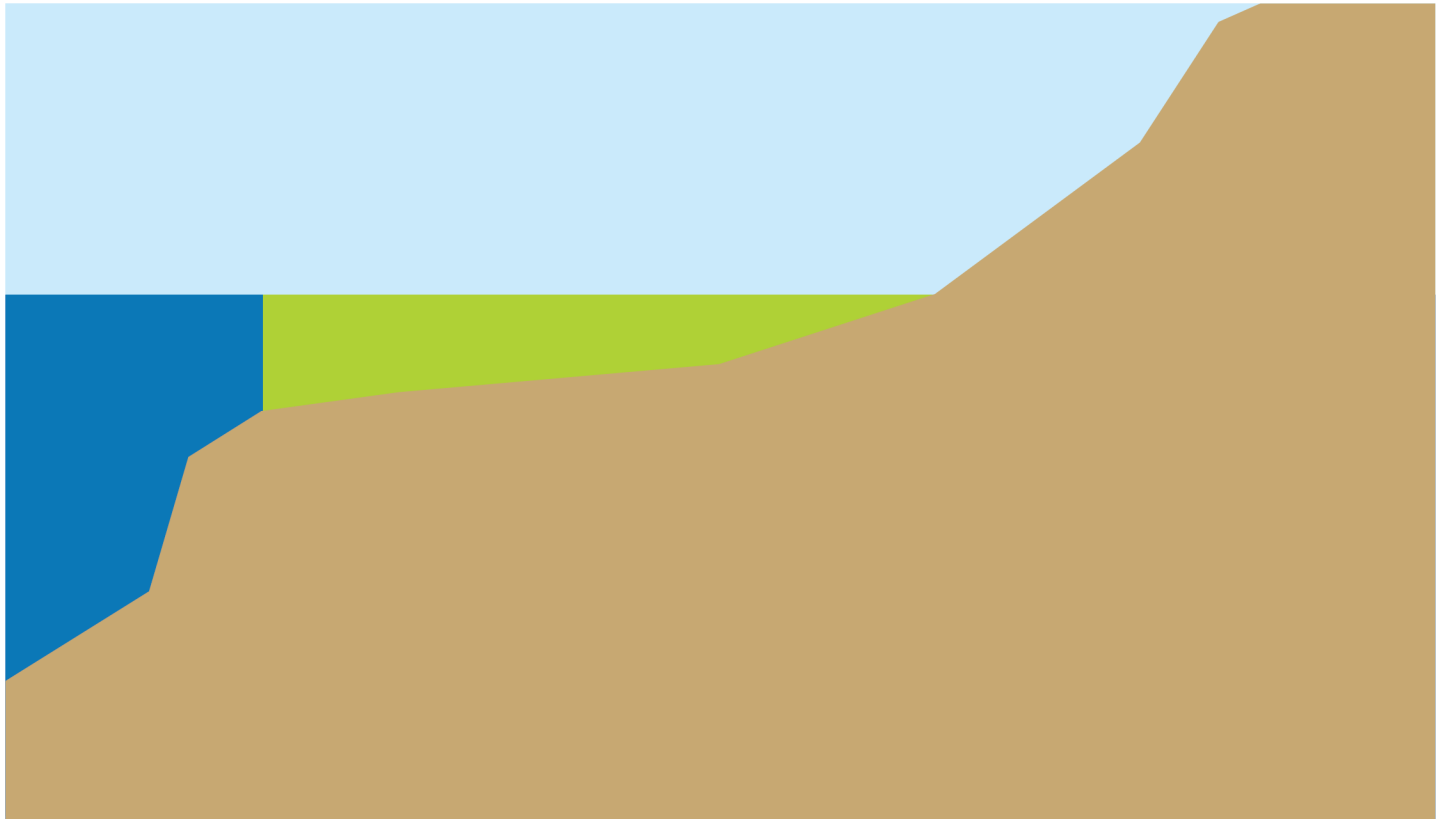
Delta Formation

200 years ago



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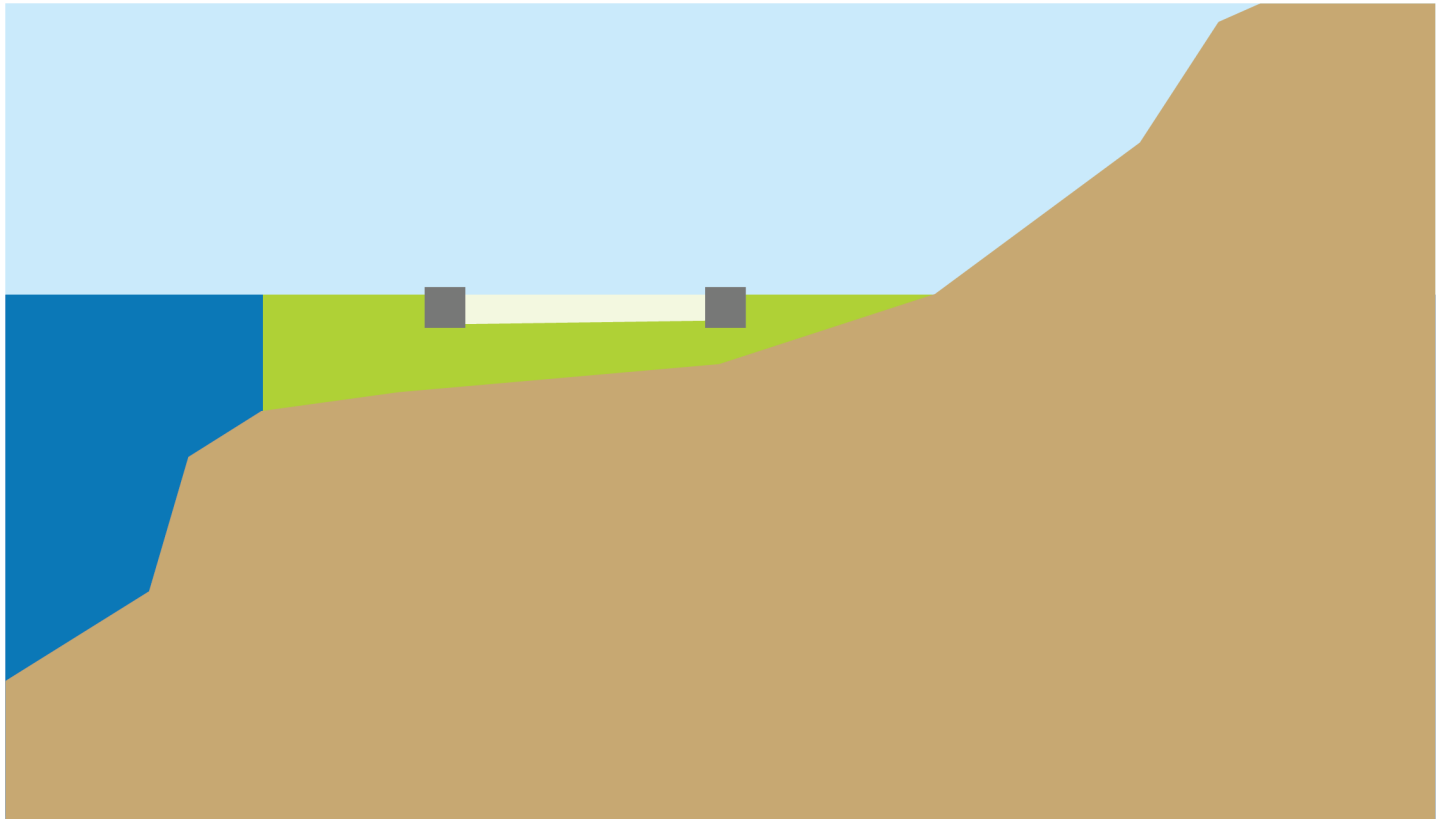
Delta Formation

Today



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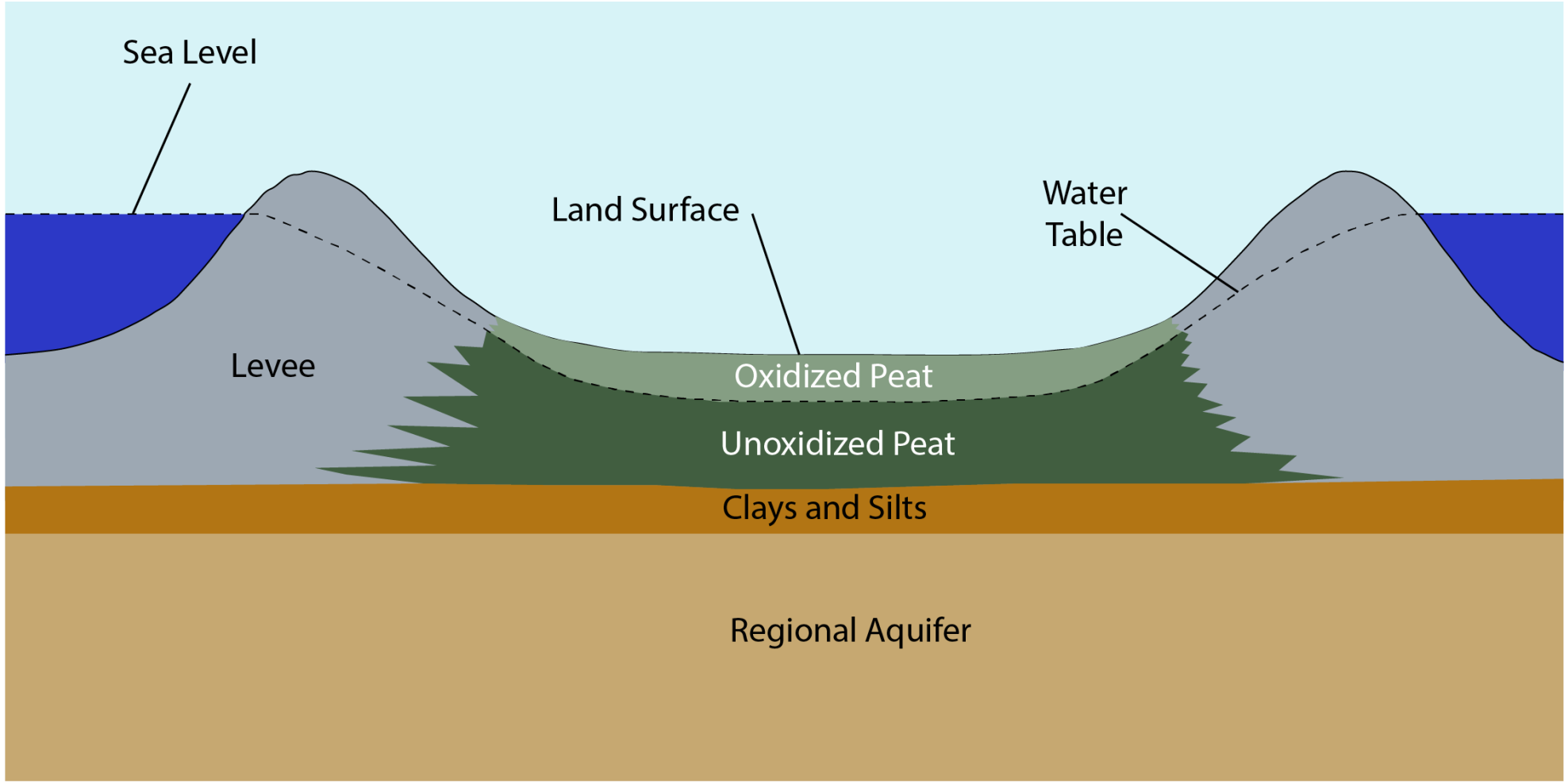
Delta Island Cross-Section



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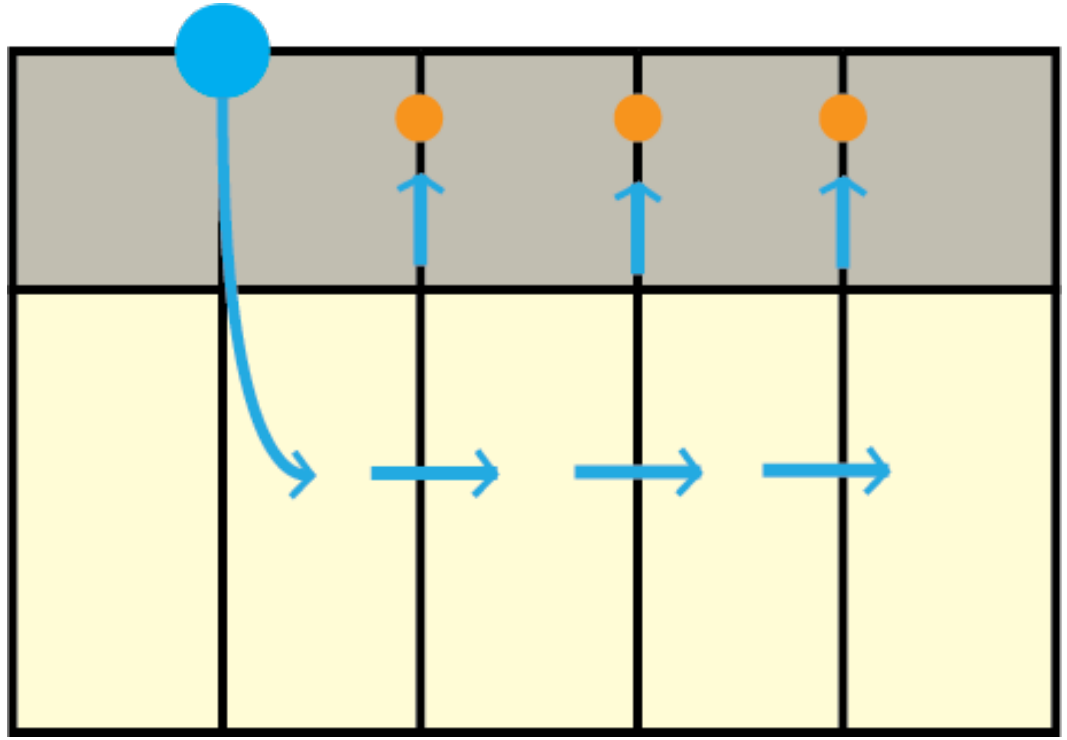
Layering

- Thin peat and clay soils with very low K_h
- Underlying mineral sediments with high K_h
- Water flows downward from streams, then laterally in mineral sediments
- Drains and pumps remove water
- Strong vertical gradients in top 30-40 ft



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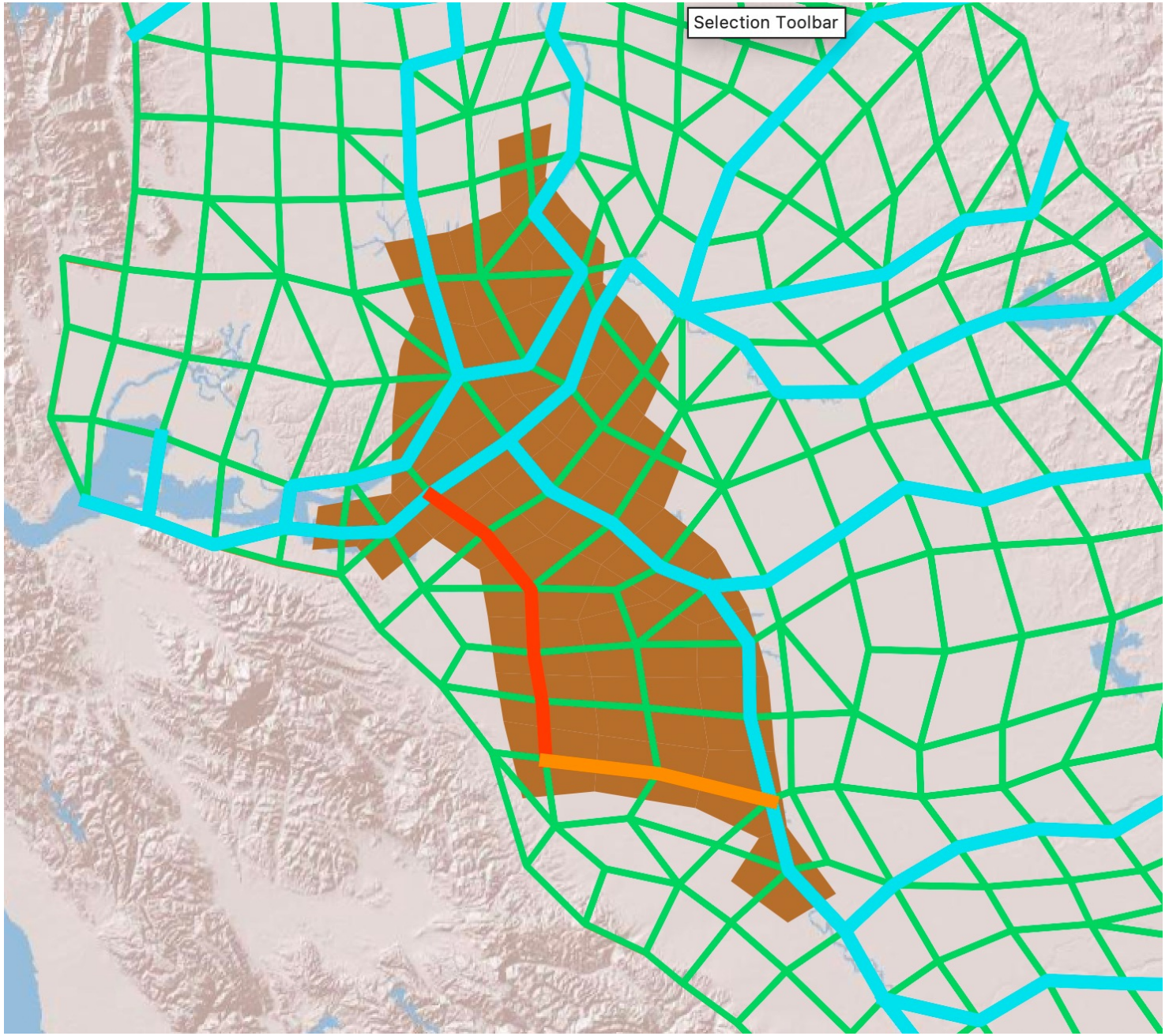
Layer 1 Changes

- 27 nodes modified
- Top layer was ~200 ft thick
- Top layer now 40 ft thick, add the rest to second layer
- $K_h = K_v = 0.05 – 0.10$ ft/day (Deverel et al 2017)
- Tile drains 5 ft BGS



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C2VSimCG Delta Update

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- Ground Surface Elevation, Layering and Drains
- Delta Island Diversions, Seepage and Drainage

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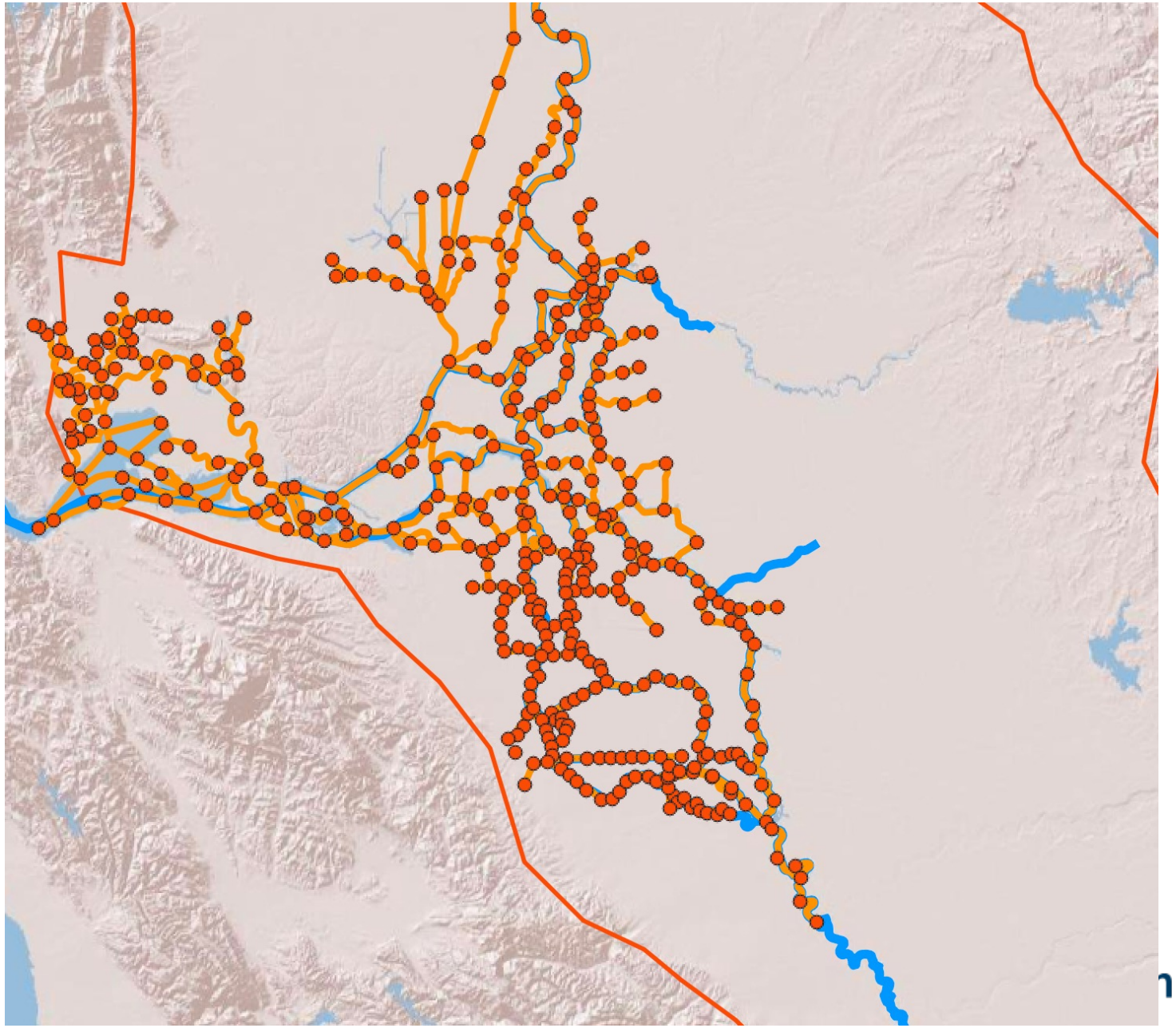
DSM2 Data

- Diversions
- Seepage
- Drainage



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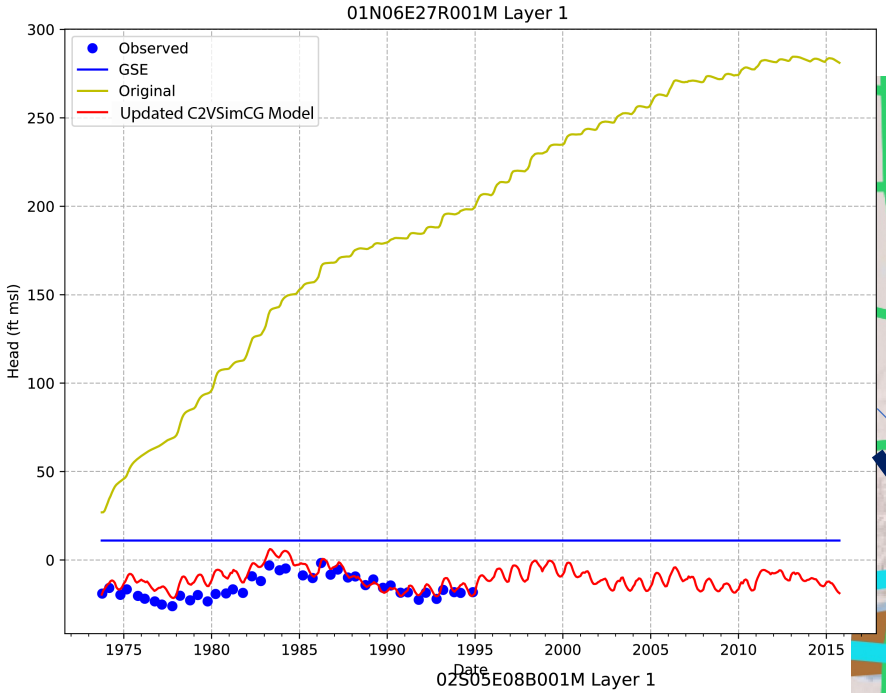

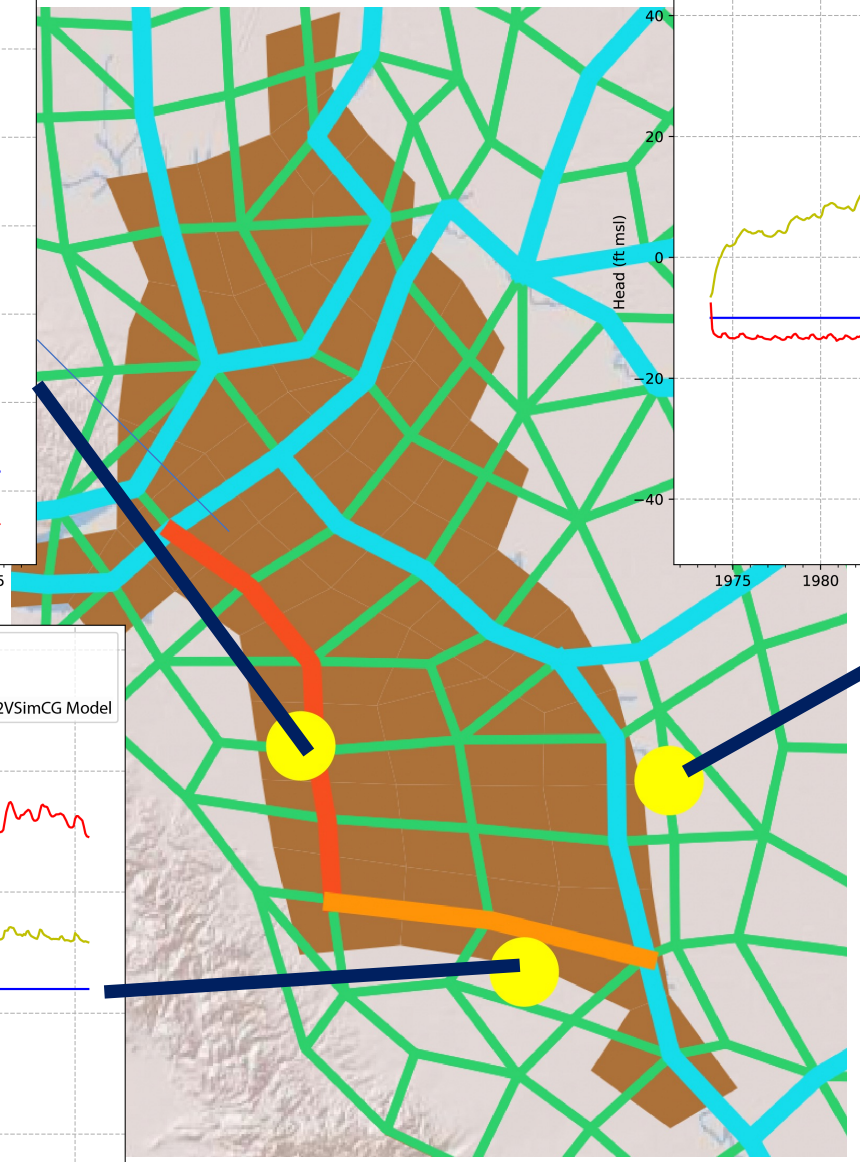

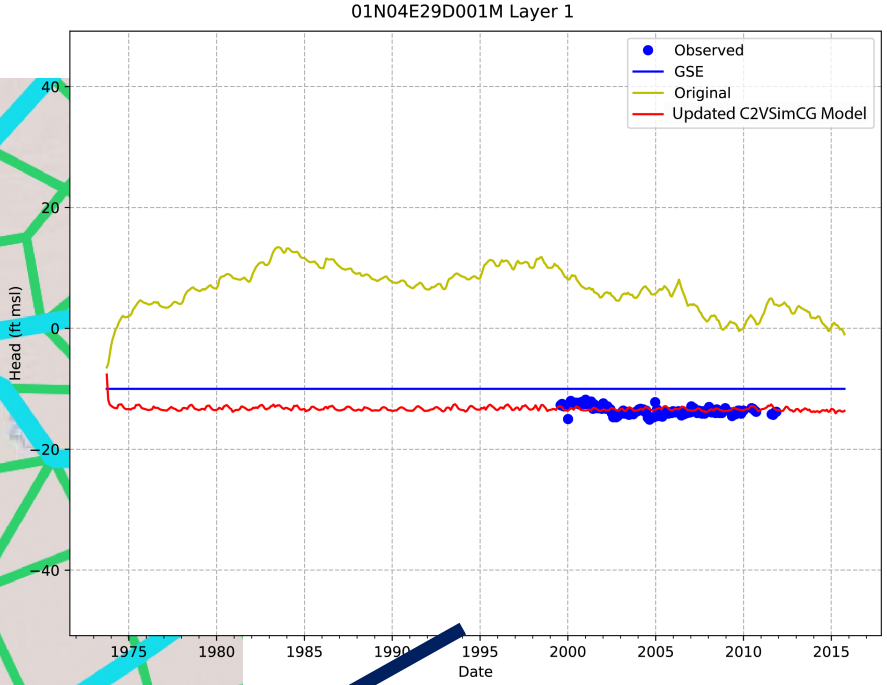

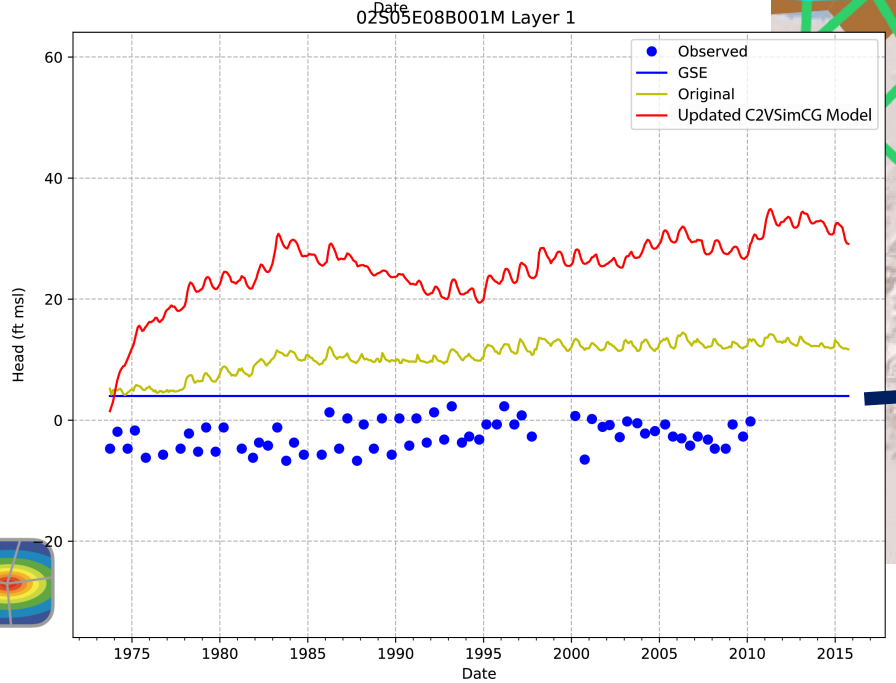

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Summary

- Improved on original C2VSimCG Delta river representation
- New layering better represents Delta hydrogeology
- Improved performance vs historical data
- Coarse grid limits resolution
- Predetermined bypass flows limit flexibility