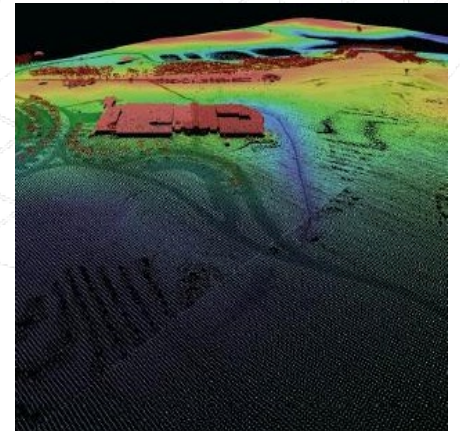
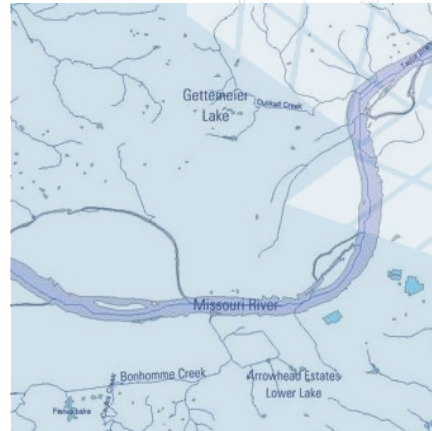
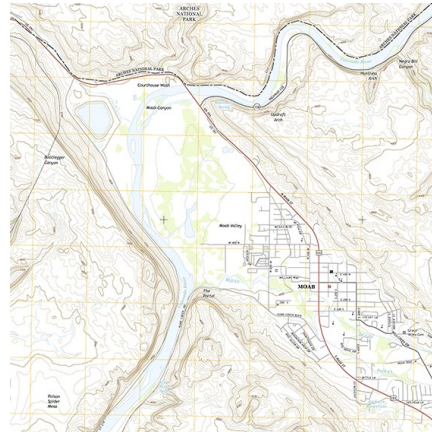




NHDPlus High Resolution Value Added Attributes



NHDPlus HR Value Added Attributes (VAAs)

- NHDPlus HR is built through an automated process that analyzes **National Hydrography Dataset (NHD)**, **Watershed Boundary Dataset (WBD)**, and **3D Elevation Program (3DEP)** data.
- This analysis produces a set of value added geospatial layers and hundreds of attributes.
- Many of the attributes are computed from the analysis of the NHD network.
- These attributes are designed to make the NHD network more powerful and easier to use.
- See <https://usgs.gov/NHDPlusHR/VAAs>,
<https://pubs.er.usgs.gov/publication/ofr20191096>

NHDPlus HR Value Added Attributes (VAAs)

NHDPlus Analysis VAAs

- StreamOrder
- StreamCalculator
- ArbolateSum
- ReturnDivergence
- PathLength

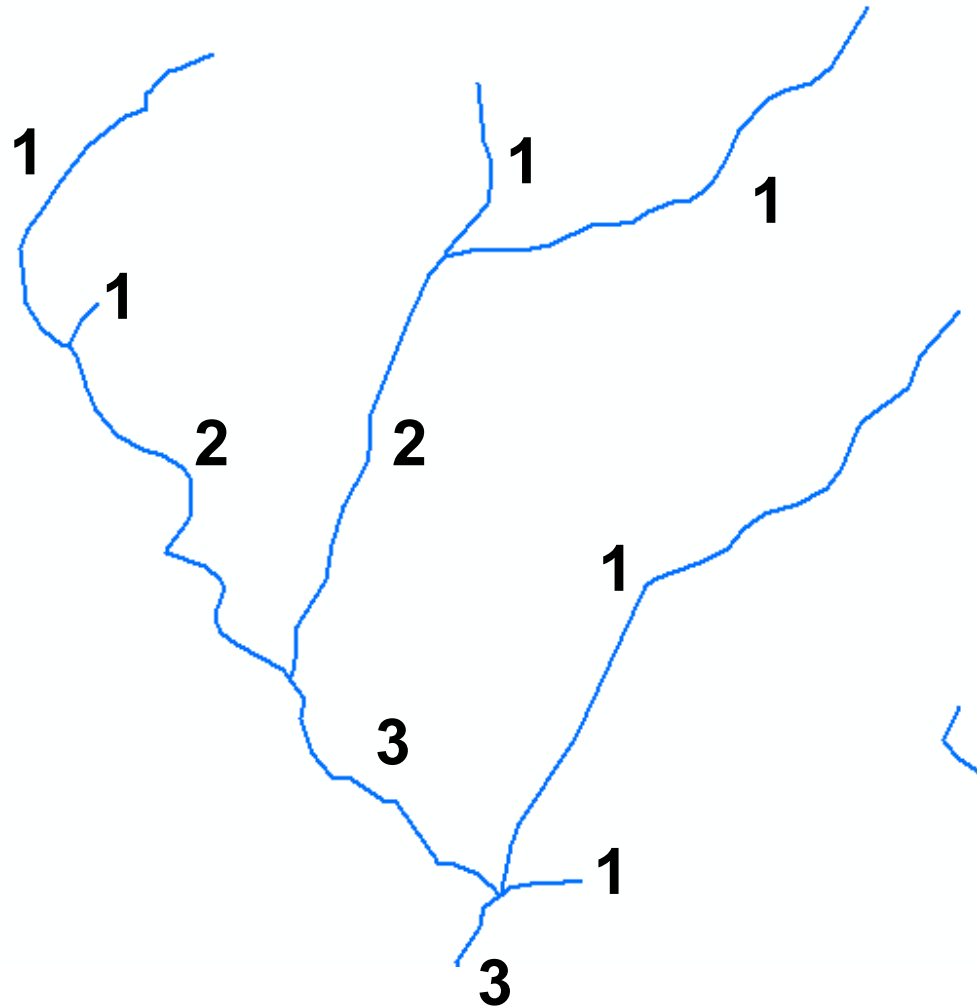
NHDPlus Navigation VAAs

- | | |
|-------------------|-------------------|
| ■ FromNode/ToNode | ■ VPUIn/VPUOut |
| ■ Hydroseq | ■ UpLevelPathID |
| ■ LevelPathID | ■ UpHydroSeq |
| ■ TerminalPathID | ■ DnStreamLevel |
| ■ StreamLevel | ■ DnLevelPathID |
| ■ Divergence | ■ DnMinorHydroseq |
| ■ StartFlag | ■ DnDrainCount |
| ■ TerminalFlag | |

NHDPlus Value Added Attributes (VAAs)

Strahler Stream Order

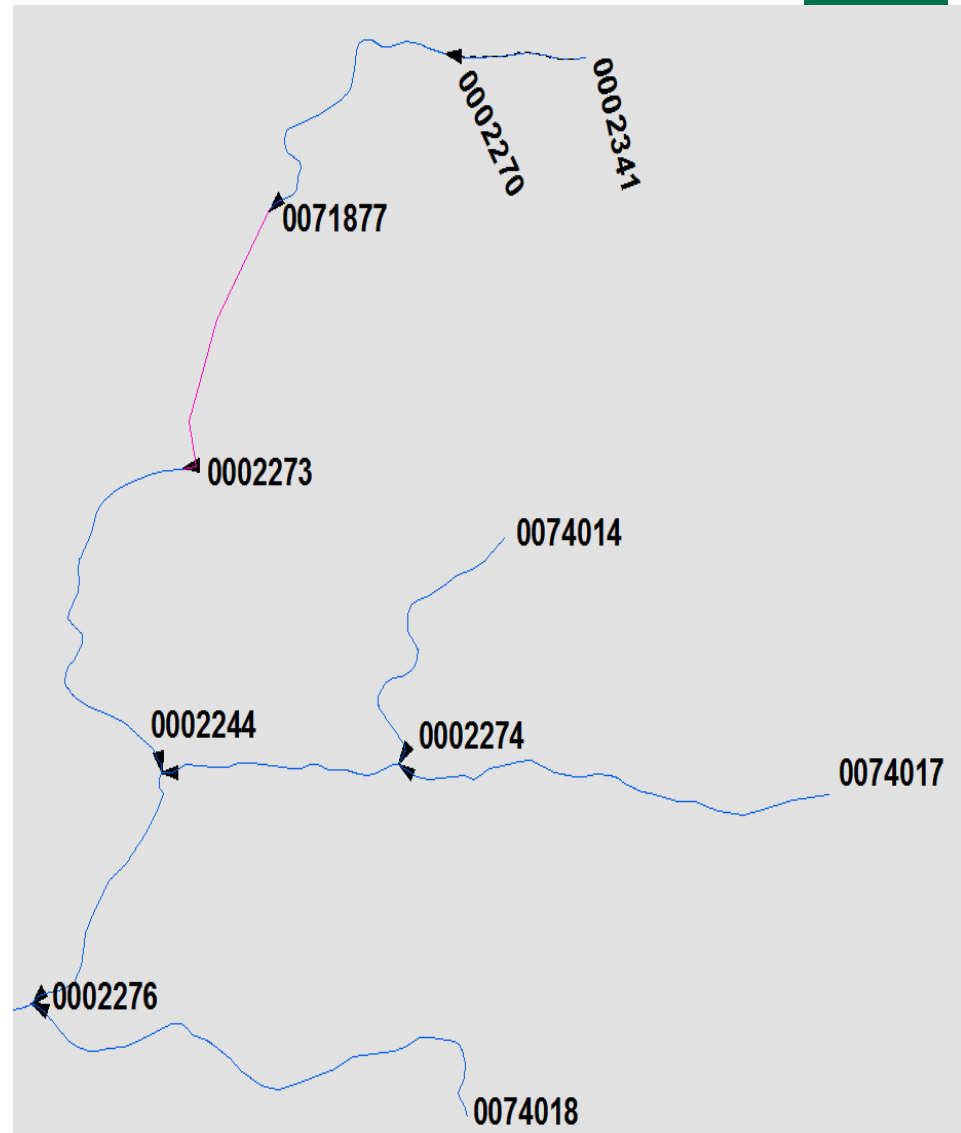
- A surrogate for stream size
- A popular analysis attribute



NHDPlus Value Added Attributes (VAAs)

FromNode/ToNode

- A set of nationally unique identifiers for the node endpoints of the flowlines
- This supports the many models that use linked node navigation
- Note there is no actual node feature class



NHDPlus Value Added Attributes (VAAs)

PathLength

- The distance downstream to the network terminus

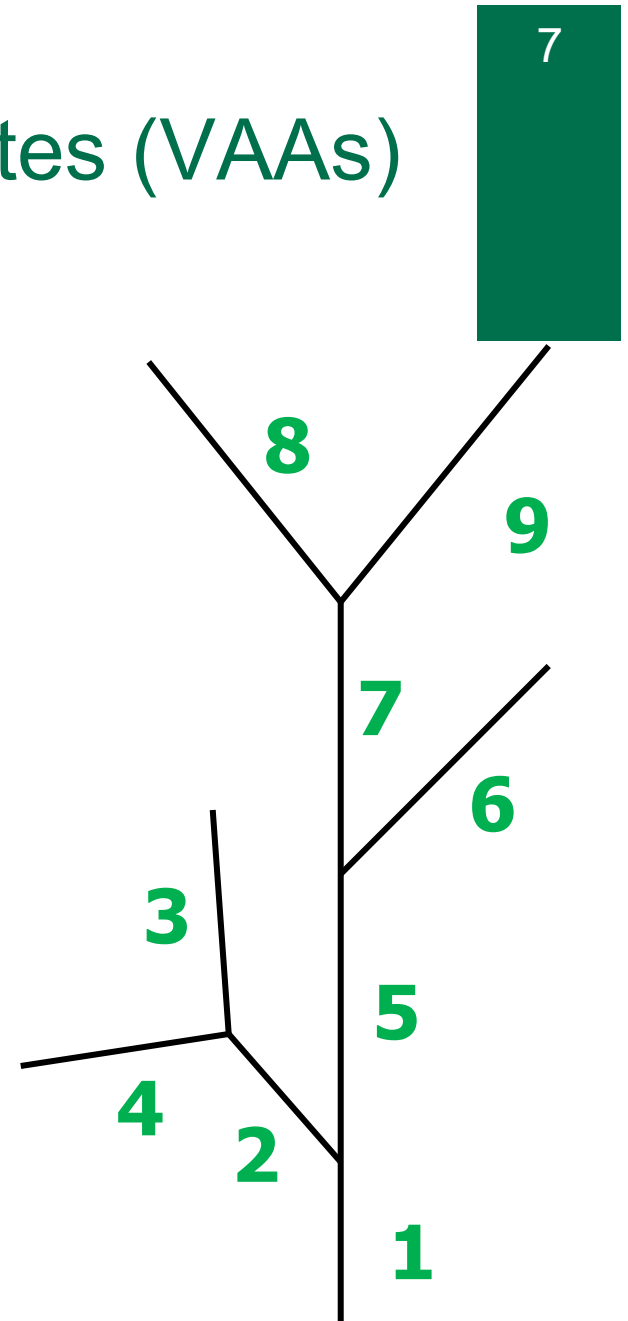


+

NHDPlus Value Added Attributes (VAAs)

Hydrologic Sequence Number (HYDROSEQ)

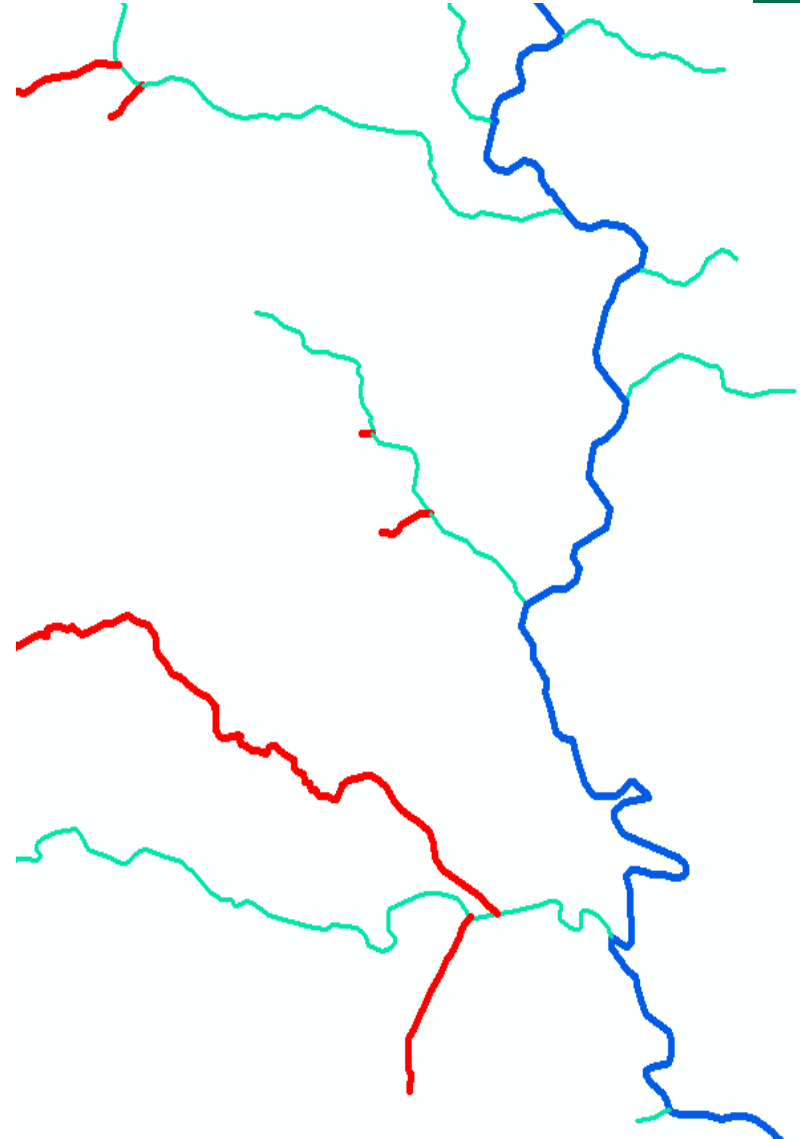
- A nationally unique sequence number that places NHD flowline features in hydrologic sequence
 - Ascending = downstream to up
 - Descending = upstream to down
- Enables models to process the network in a tabular manner without using geometry flowlines



NHDPlus Value Added Attributes (VAAs)

StreamLevel

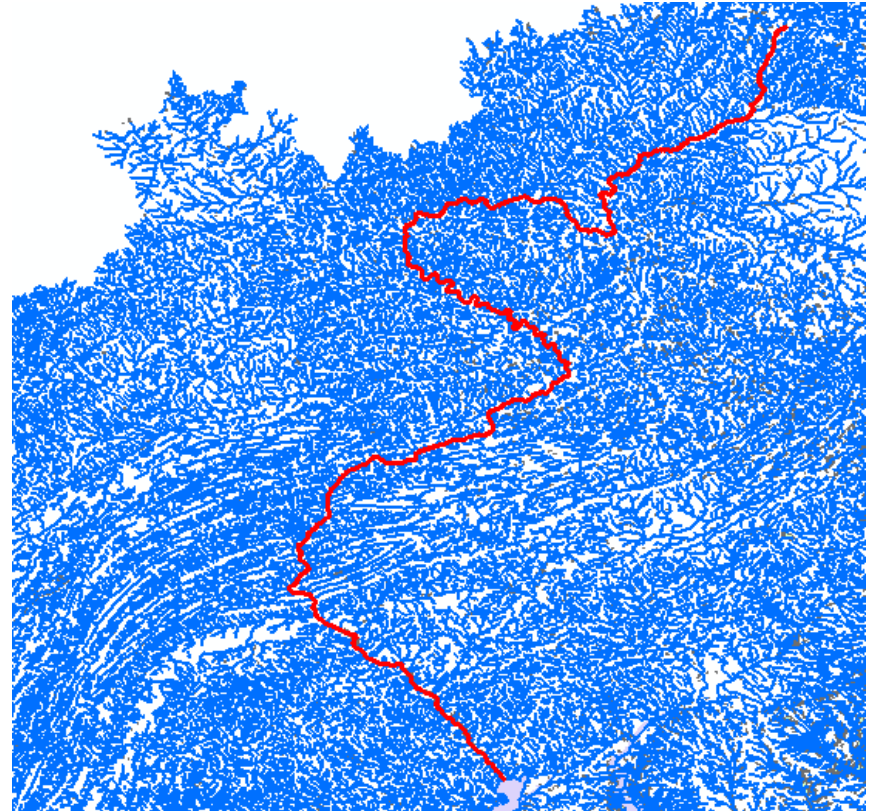
- Provides the information necessary to determine the main path upstream at each confluence
 - **Blue** = StreamLevel 1
 - **Green** = StreamLevel 2
 - **Red** = StreamLevel 3
- This supports upstream navigation of a river mainstem



NHDPlus Value Added Attributes (VAAs)

LevelPathIdentifier

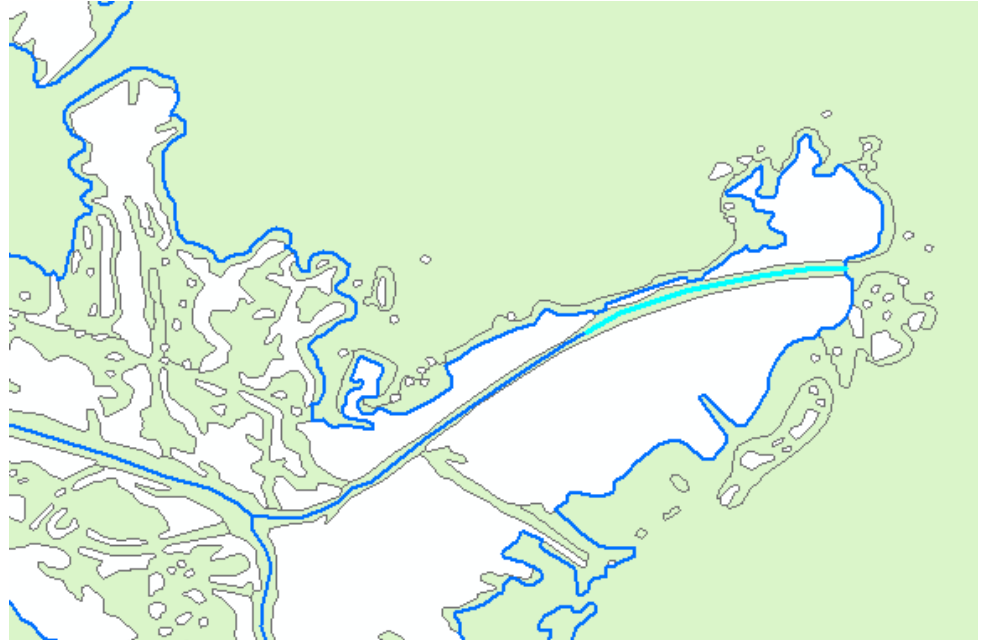
- The identifier (HydroSeq) for all the flowlines on a level path from mouth to headwaters
- River Main Stem



NHDPlus Value Added Attributes (VAAs)

TerminalPathIdentifier

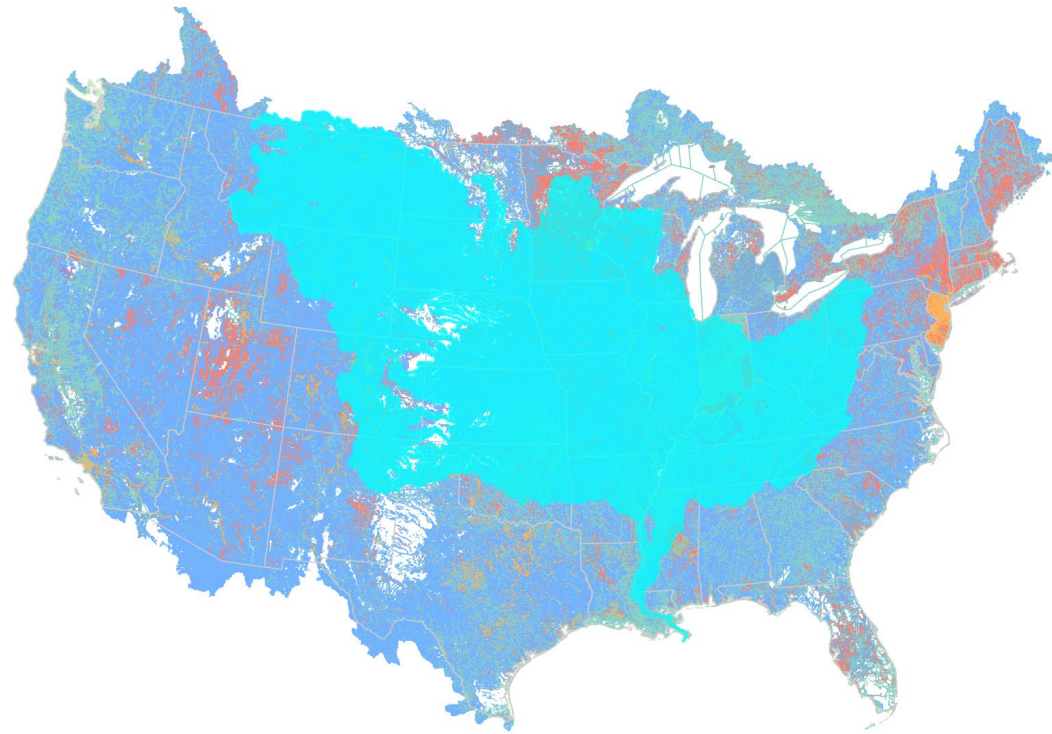
- The identifier (HydroSeq) for the terminal flowline in this network



NHDPlus Value Added Attributes (VAAs)

Total Upstream Drainage Network

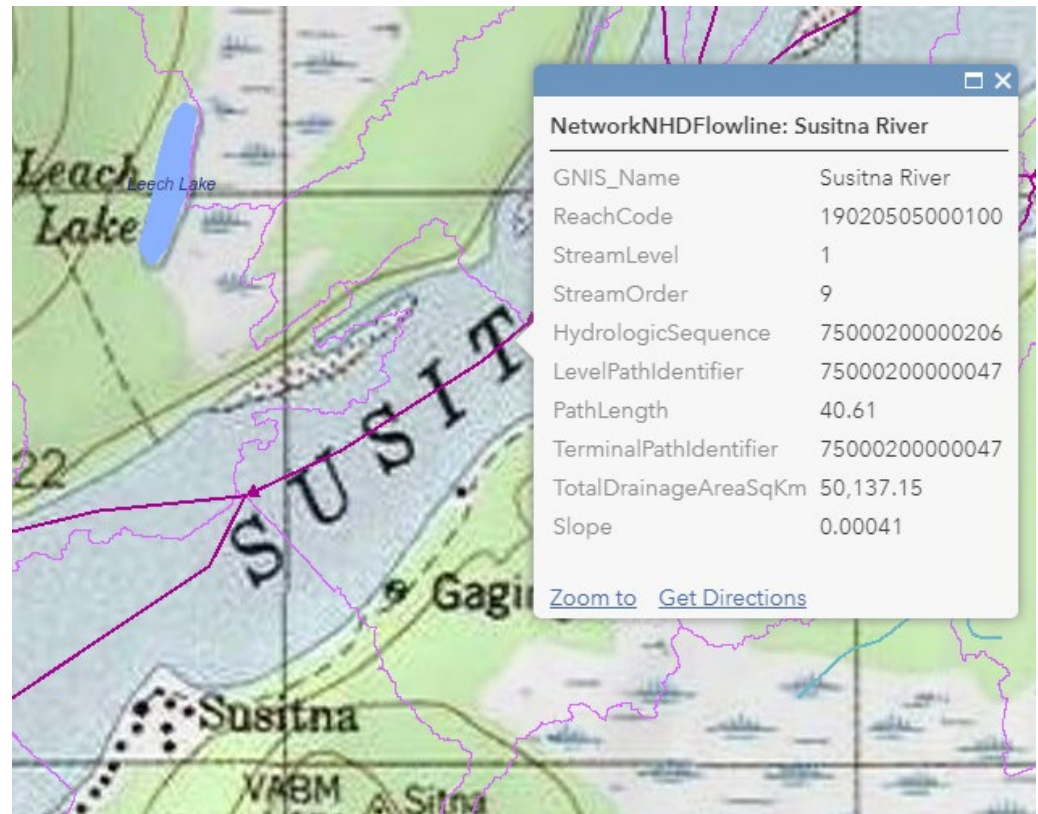
- A simple select TerminalPathIdentifier to identify the upstream drainage network



NHDPlus Value Added Attributes (VAAs)

Total Upstream Drainage Area

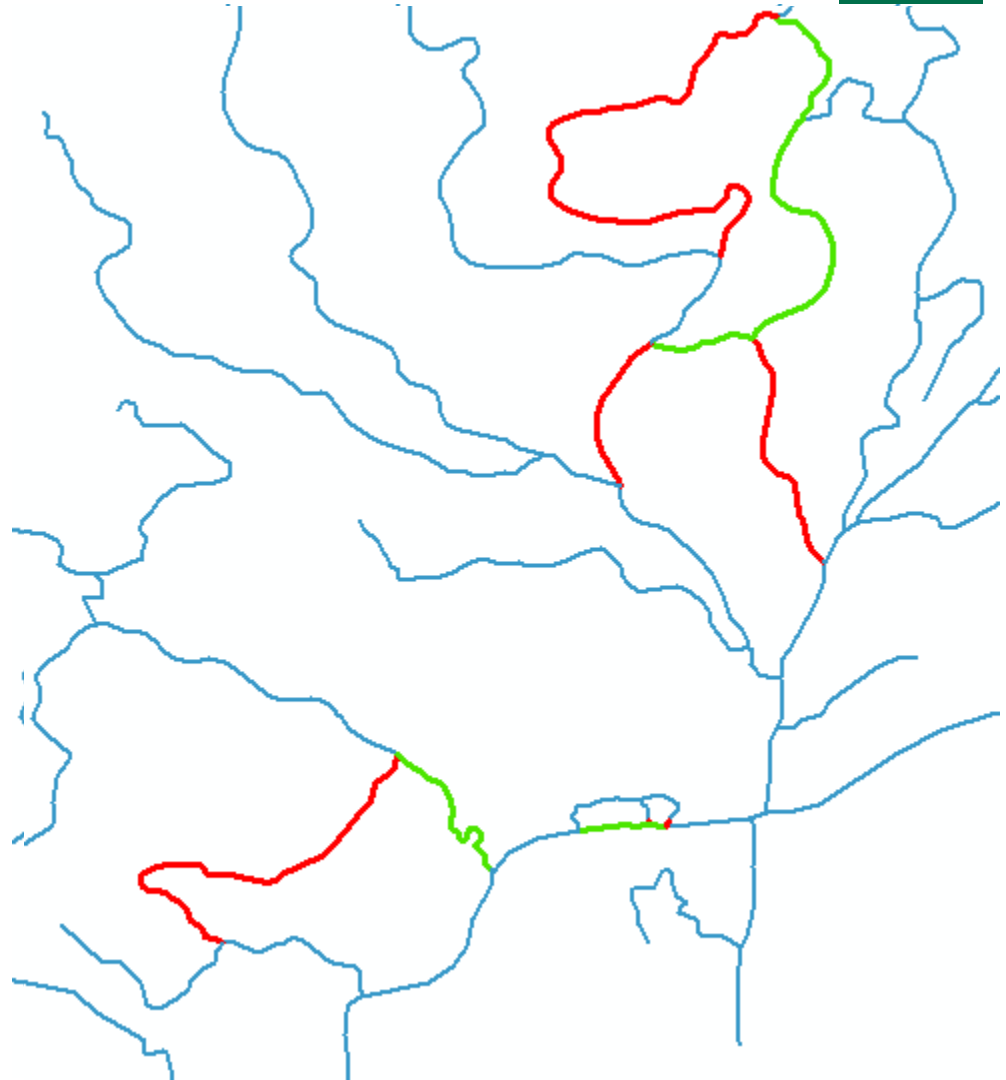
- Each flowline has total upstream drainage area already computed
- Plus... many other attributes



NHDPlus Value Added Attributes (VAAs)

DivergenceCode

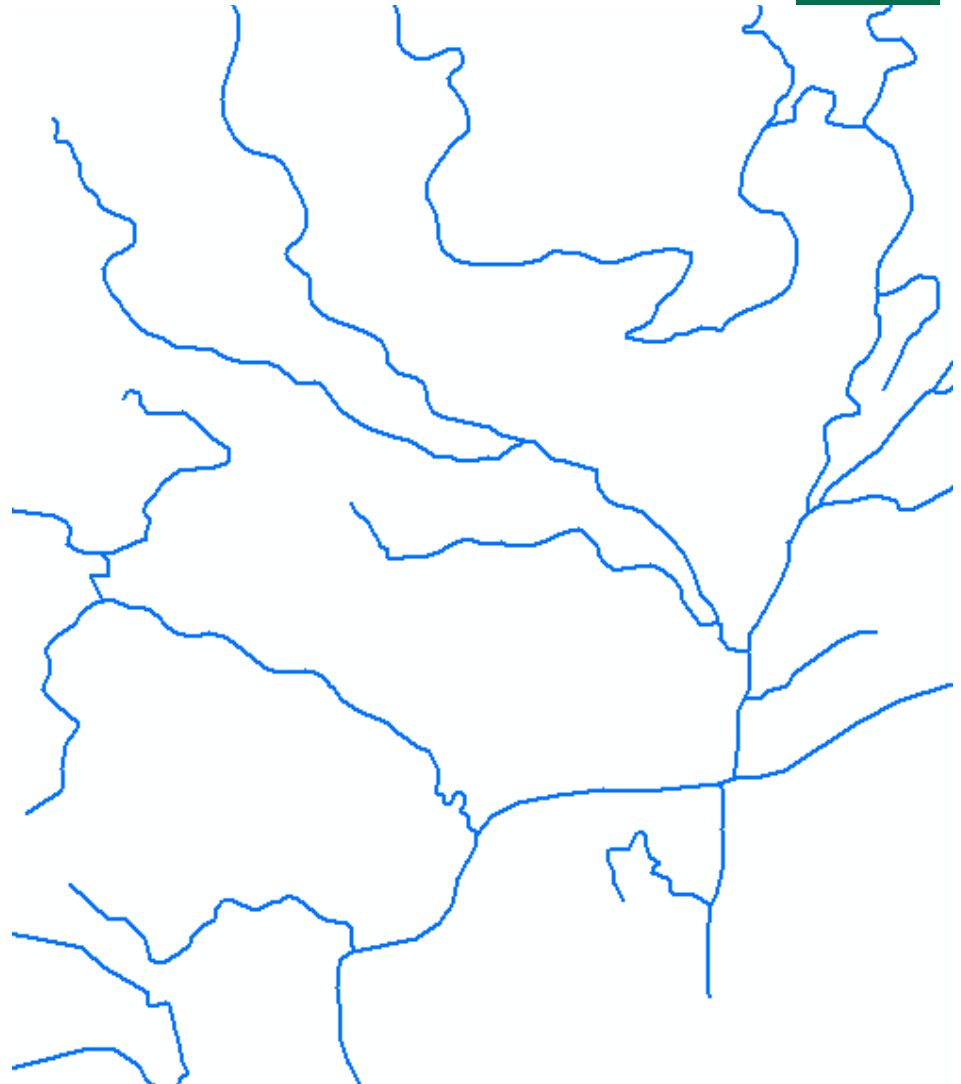
- A flag which defines the major and minor branches of a flow split (divergence)
- This supports downstream navigation of the network mainstem



NHDPlus Value Added Attributes (VAAs)

Dendrite

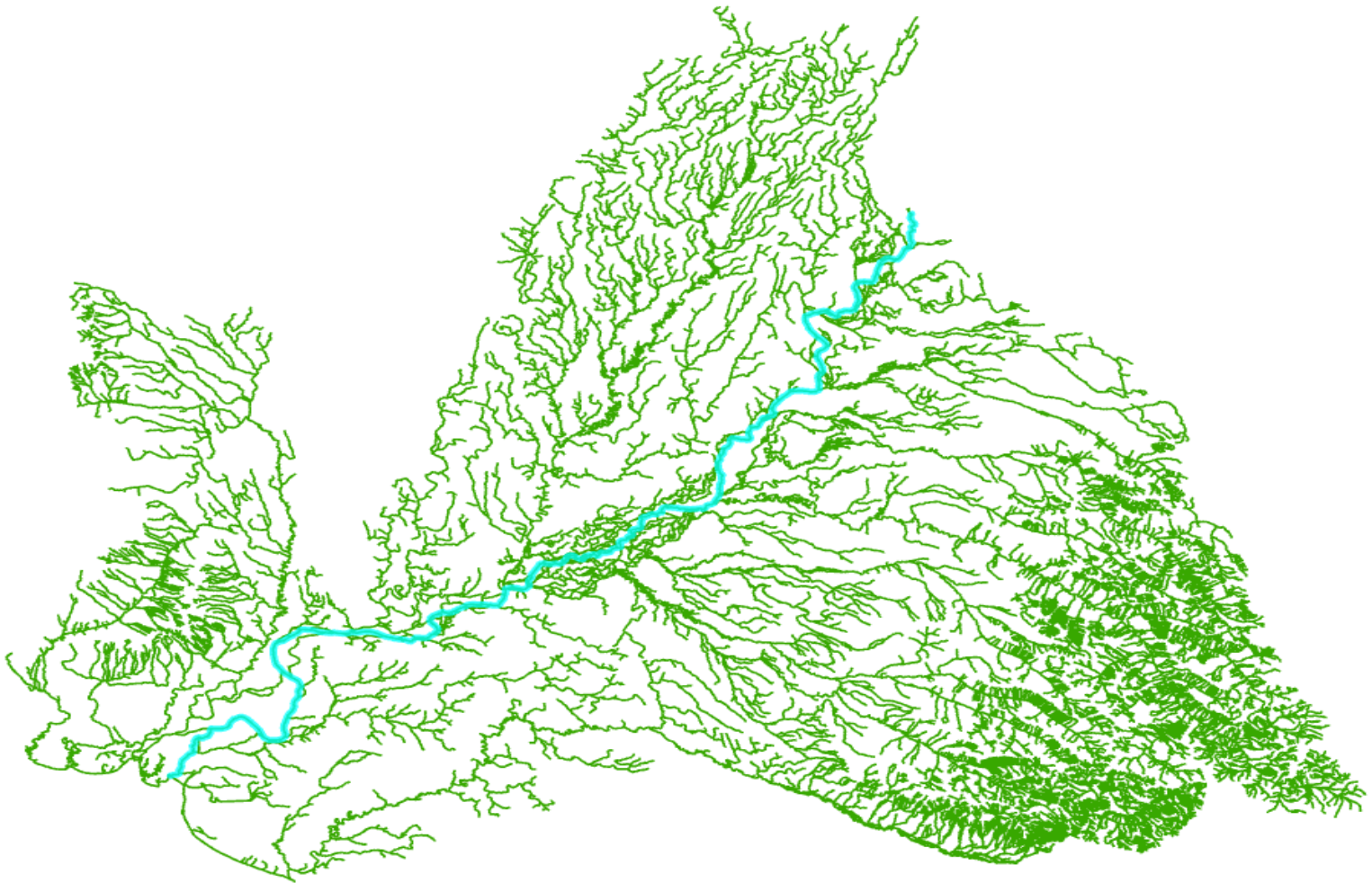
- Remove divergence minor paths and create a dendritic network
- Some models require a dendritic network
- Select for **StreamOrder = StreamCalc**



Putting it all together

LevelPathID: Selects the Susitna River

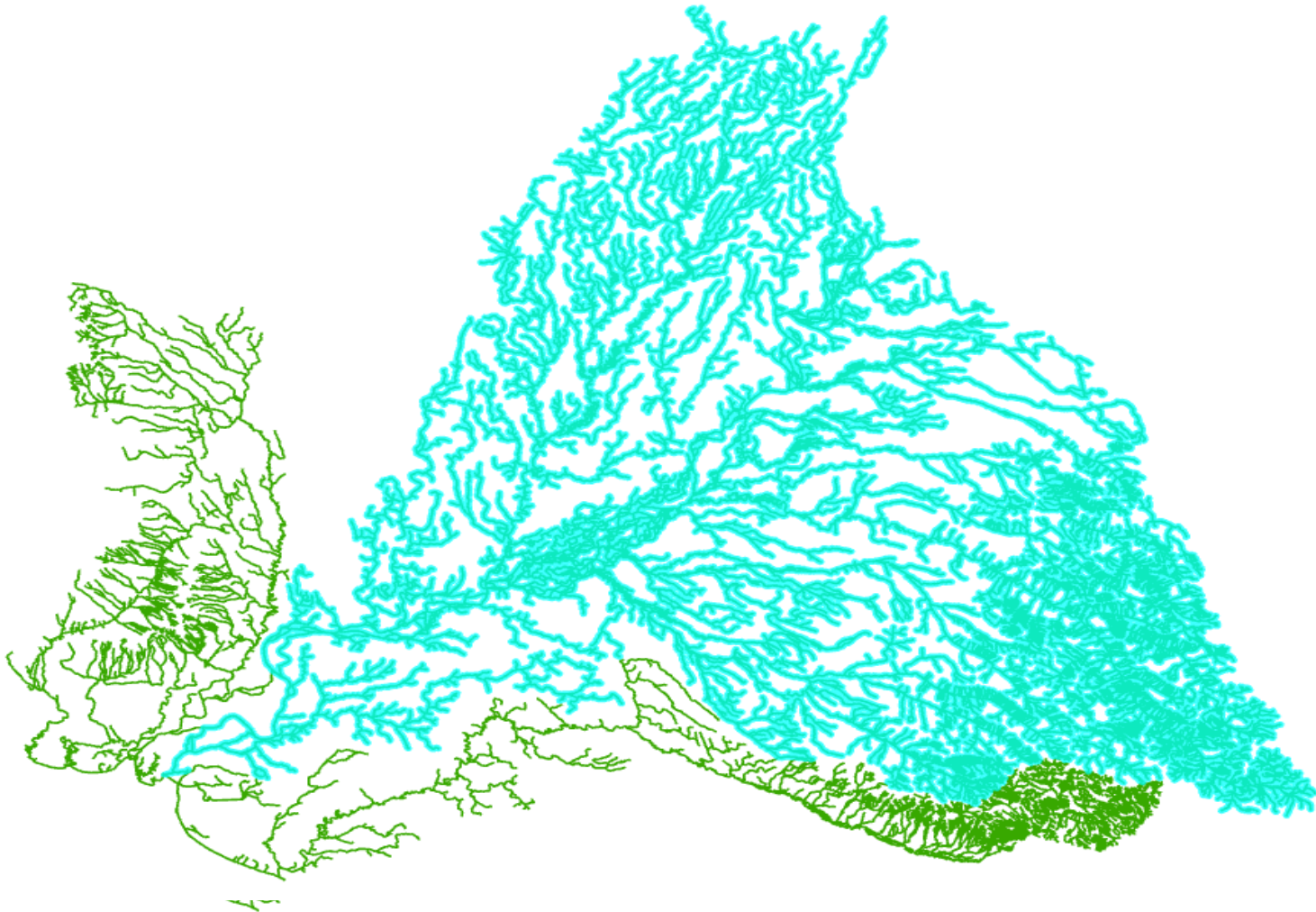
15



Putting it all together

16




TerminalPathIdentifier: Selects everything upstream of the Susitna River

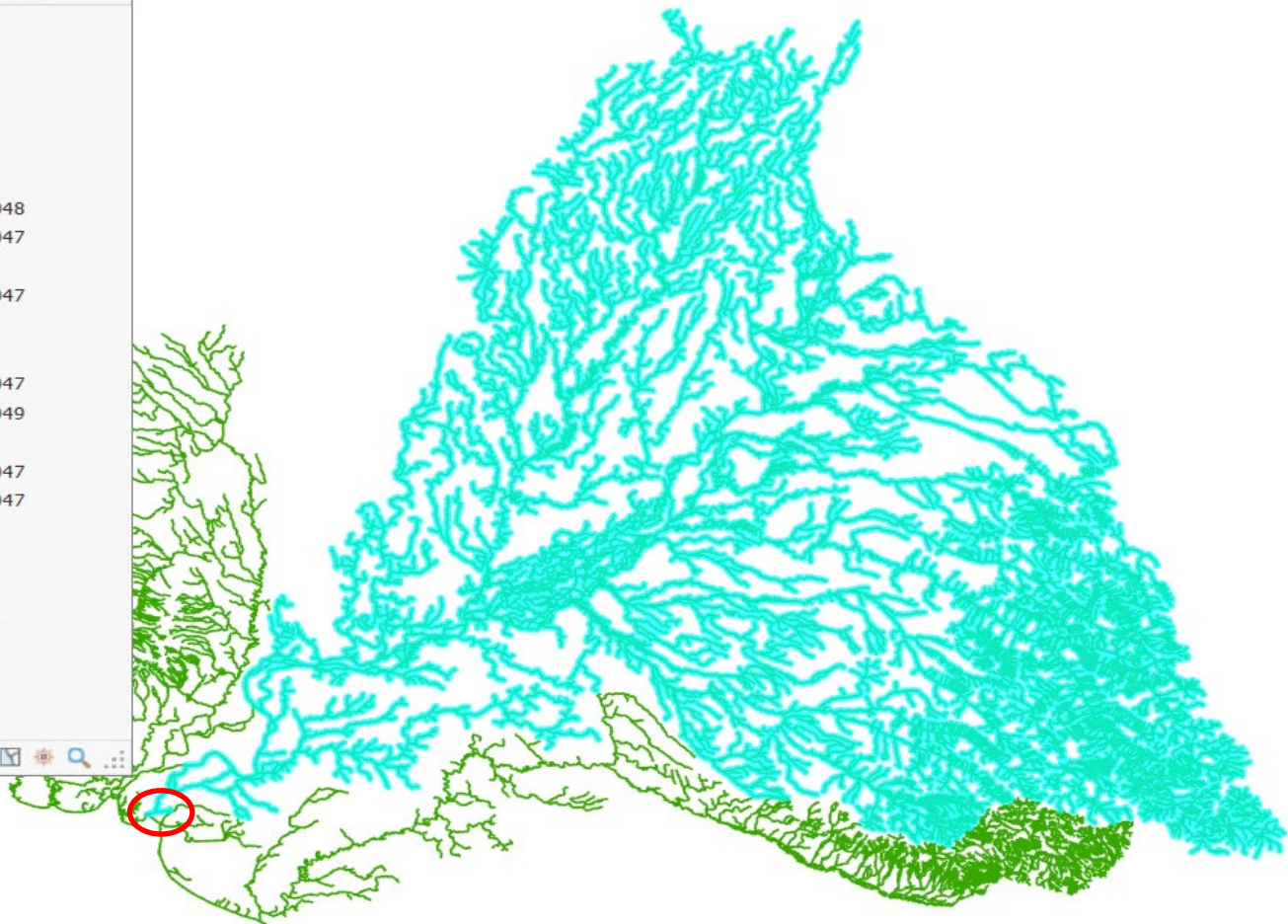




Putting it all together

ArbolateSum (UpstreamCumulativeStreamKm):
65,491 km

NHDFlowline_VAA - Susi...   	
OBJECTID	234
GNIS_Name	Susitna River
LengthKm	0.731085
StreamLeve	1
StreamOrde	9
StreamCalc	9
HydroSeq	75000200000048
LevelPathI	75000200000047
PathLength	0.10467
TerminalPa	75000200000047
ArbolateSu	65491.159499
Divergence	0
UpLevelPat	75000200000047
UpHydroSeq	75000200000049
DnLevel	1
DnLevelPat	75000200000047
DnHydroSeq	75000200000047
DnMinorHyd	0
DnDrainCou	1
VPUOut	0
TotDASqKm	50623.454165
DivDASqKm	50623.454165
HWType	
VPUID	19020505

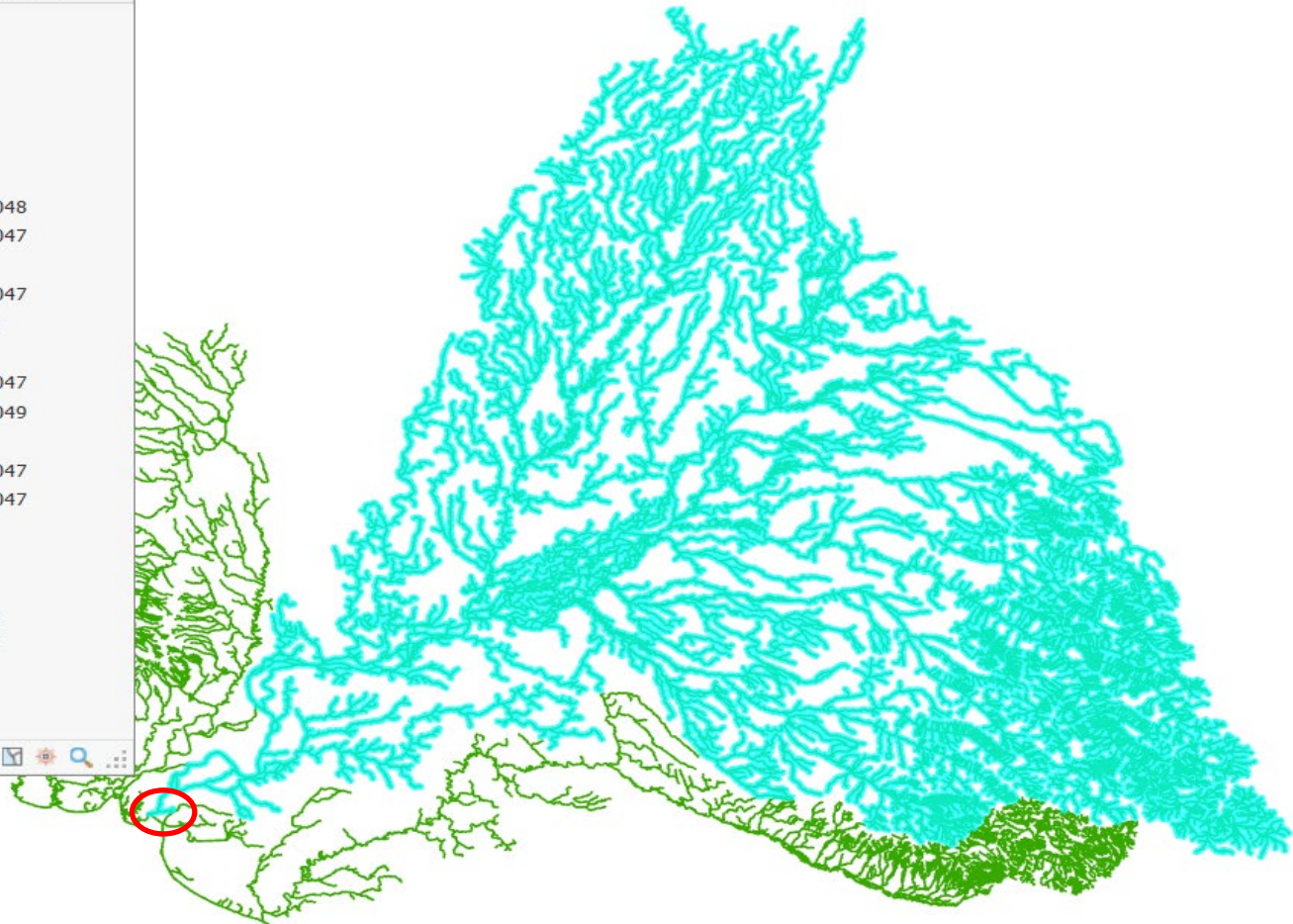




Putting it all together

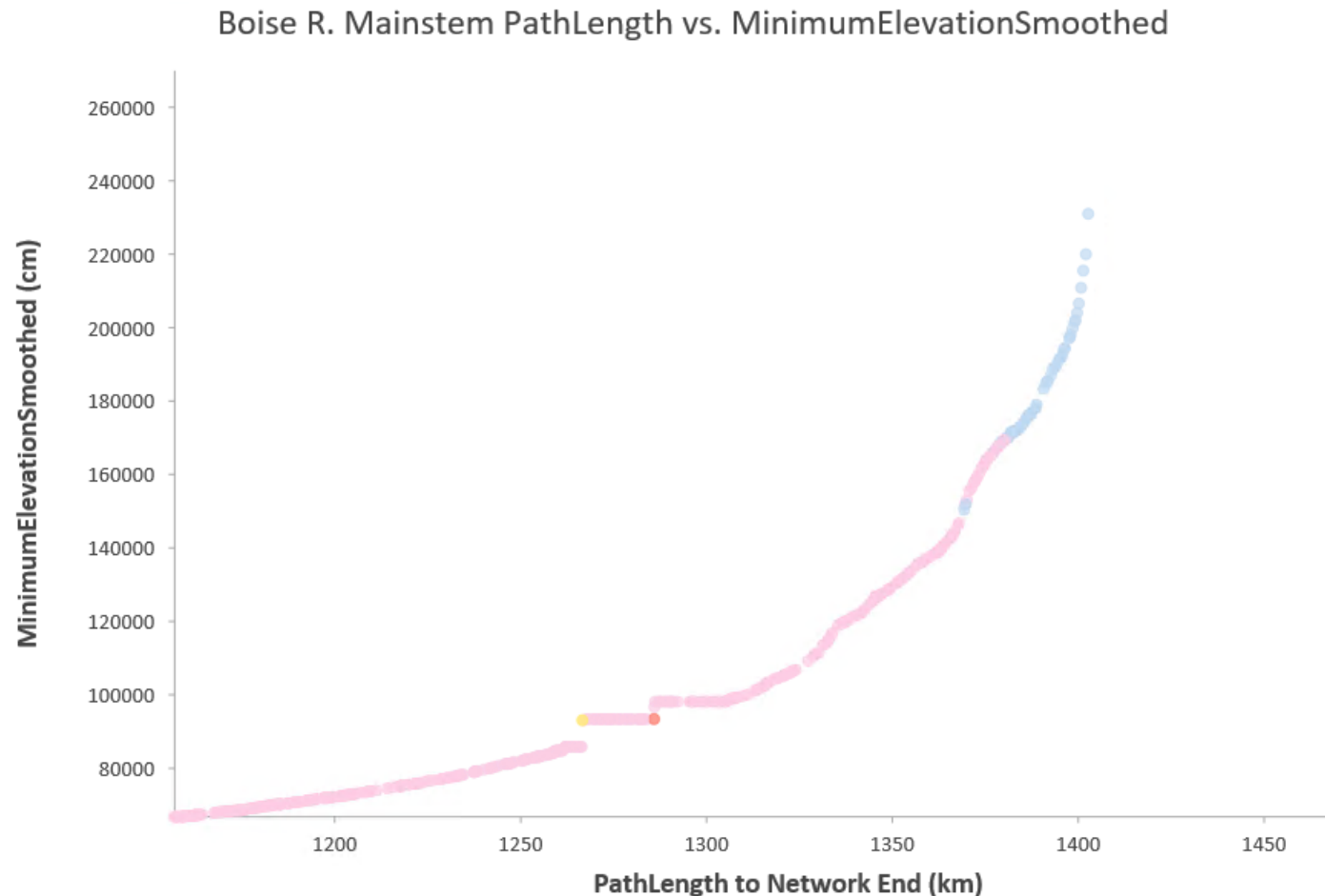
TotalDrainageAreaSqKM: 50,623 sqkm

NHDFlowline_VAA - Susi...	
OBJECTID	234
GNIS_Name	Susitna River
LengthKm	0.731085
StreamLeve	1
StreamOrde	9
StreamCalc	9
HydroSeq	75000200000048
LevelPathI	75000200000047
PathLength	0.10467
TerminalPa	75000200000047
ArbolateSu	65491.159499
Divergence	0
UpLevelPat	75000200000047
UpHydroSeq	75000200000049
DnLevel	1
DnLevelPat	75000200000047
DnHydroSeq	75000200000047
DnMinorHyd	0
DnDrainCou	1
VPUOut	0
TotDASqKm	50623.454165
DivDASqKm	50623.454165
HWType	
VPUID	19020505



Longitudinal Profile from NHDPlus HR

Plot MinimumElevationSmoothed vs PathLength for a selected LevelPathID



Longitudinal Profile from NHDPlus HR

Plot MinimumElevationSmoothed vs PathLength for selected NHDFlowlines

