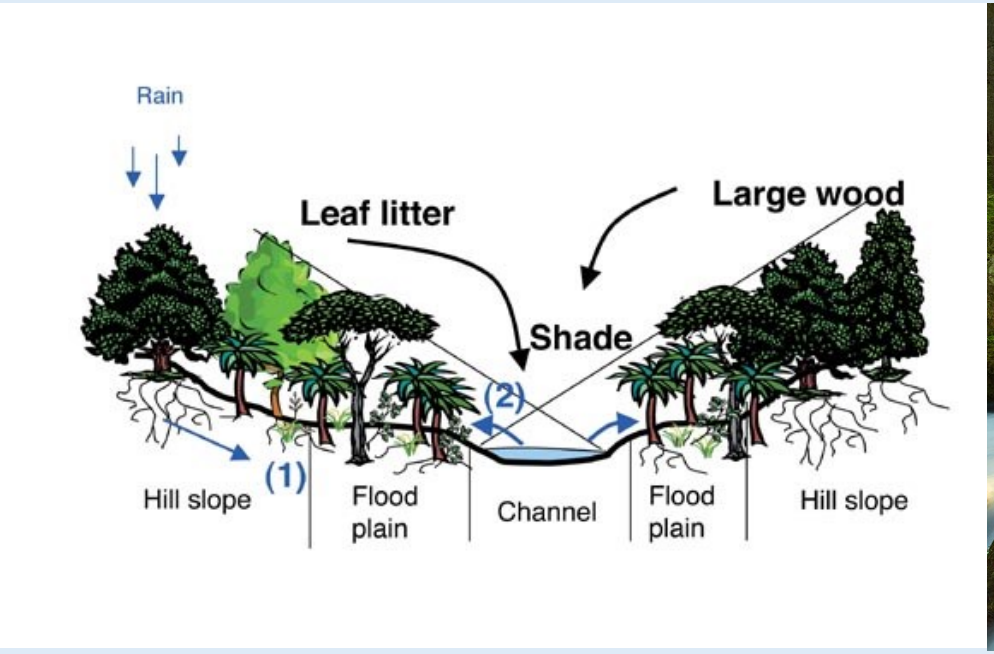
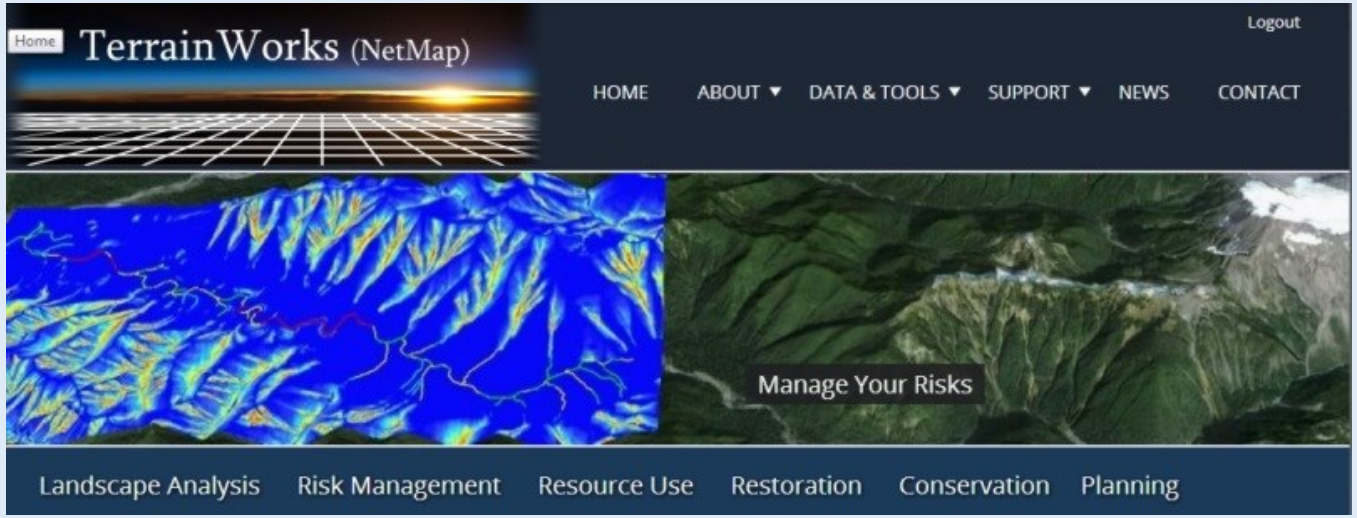
Spatially Explicit, Variable Width Riparian Zone Delineation using NetMap





Objective:

Build a process based, riparian zone delineation tool

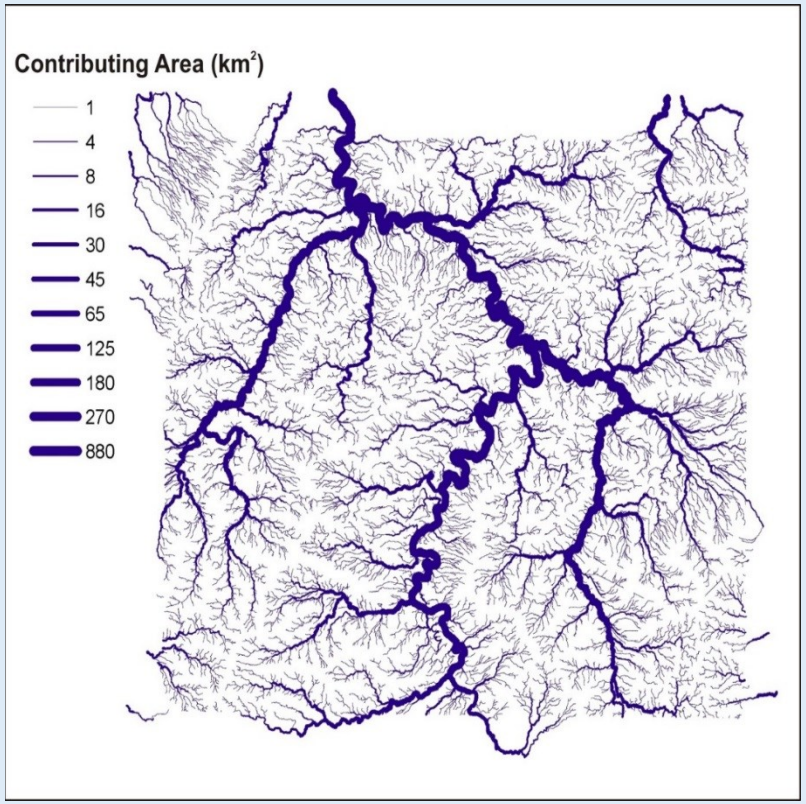
Riparian Processes

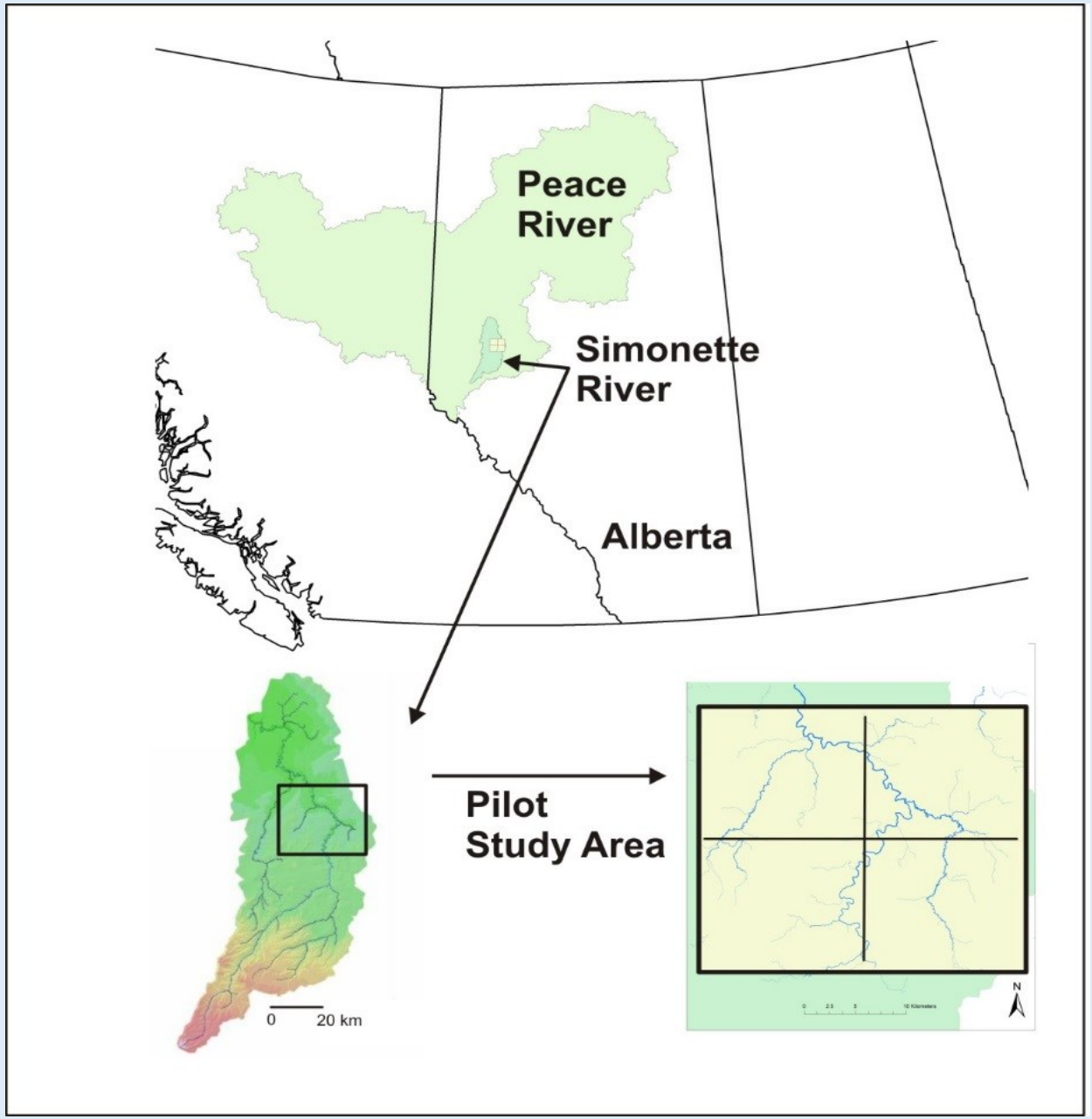
- Depth to water (wetlands)
- Floodplains
- In-stream wood recruitment
- Current vegetation shade effects on thermal energy to streams

Include Environmental Settings

- Channel types
- Habitat (fish) potential
- Hillslope erosion potential
- Channel migration
- Thermal refugia
- Tributary confluence zones
- Wildfire risk
- Climate change

Begin with a seamless, routed synthetic river network (stream layer), pilot study area, the Simonette River basin in northern Alberta, Canada

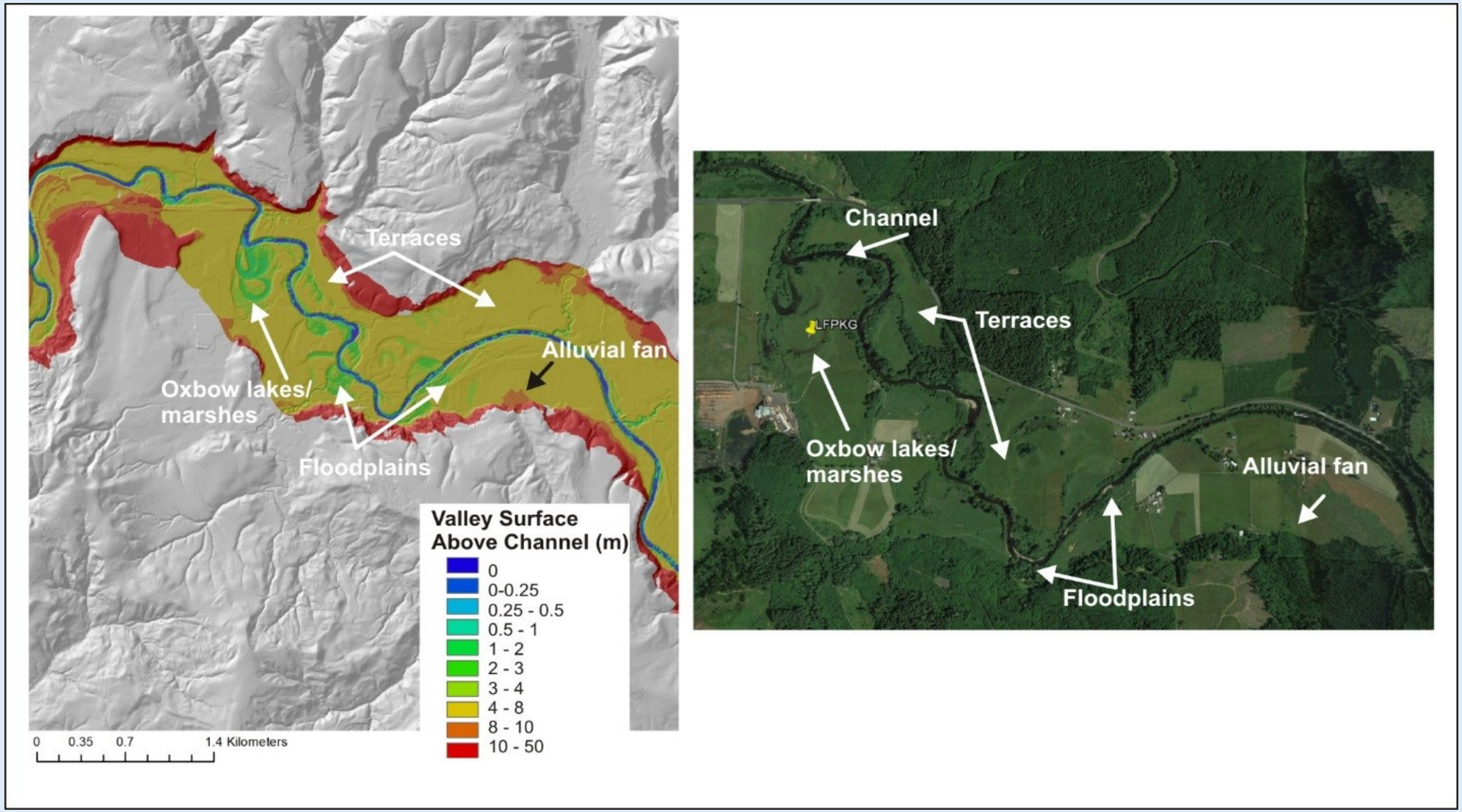




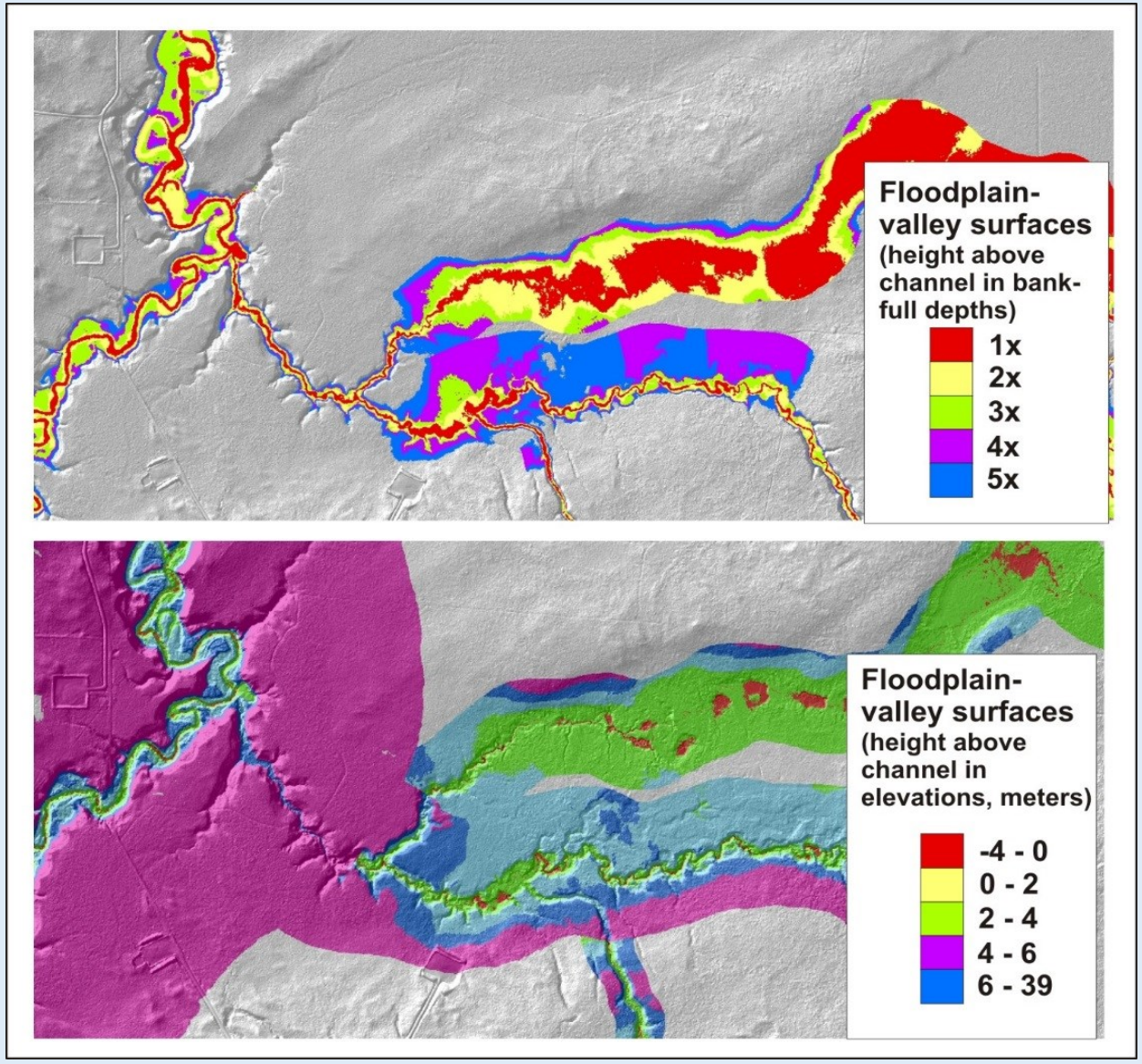
Add NetMap attributes to support spatially explicit riparian zone delineation and (optionally) within context of environmental settings.

Riparian Process/Delineation Parameters (units)	Environmental Settings Parameters (units)
Synthetic Stream Layer (Integrated WAM-NetMap)	Channel Classification (types)*
Depth to Water (in meters)	Stream order (Strahler 1952)
Drainage area (km^2)	Channel confinement (LL^{-1})
Elevation (m)	Entrenchment ratio (LL^{-1})*
Gradient (LL^{-1})	Hillslope erosion potential (GEP)
Azimuth (0 – 360°)	Sinuosity (LL^{-1})
Bankfull width (m)	Tributary confluence effects (P)
Bankfull depth (m)	Thermal refugia (watt-hours/m^2 or indexed by contributing area)
Valley Elevations/Floodplain width (n=5, m)	Channel Migration Zone (m)*
Topography (slope, curvature, distance to stream)	Maximum downstream gradient (LL^{-1})
Mean annual flow (m^3s^{-1})	Aquatic (Fish) Habitats*
Mean annual precipitation (m)	Mean annual flow (m^3s^{-1})
Thermal Energy to Channels (Bare Earth, watt-hours /m^2)	Summer habitat volume (m^3)*
Current Shade (tree height and basal area)	Wildfire risk**
In-stream wood recruitment (tree height, stand density, diameter classes)	Climate change forecasts**
Riparian vegetation (basal area, average tree height, average stand density, quadratic mean diameter)	

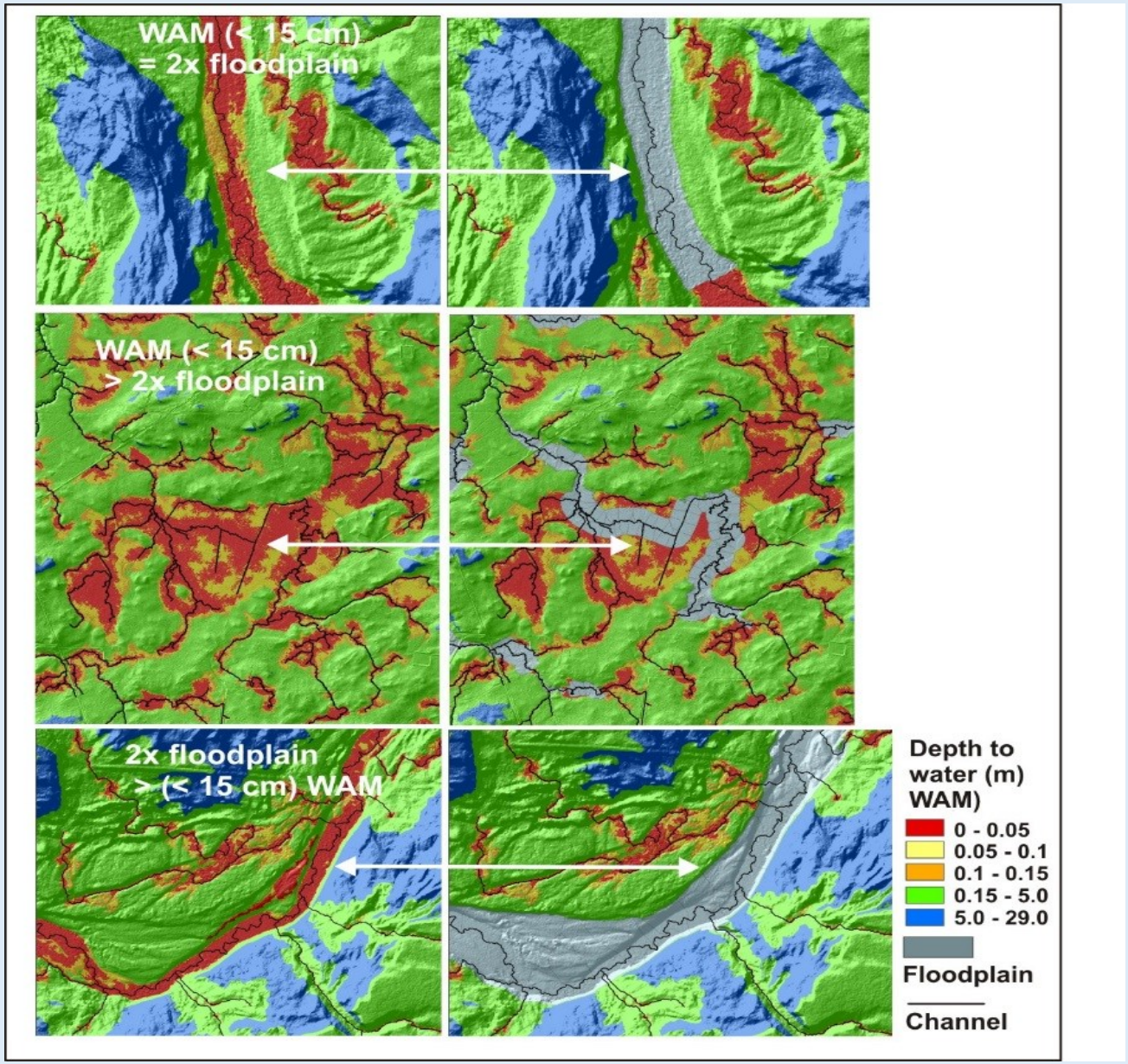
An illustration of valley floor mapping in NetMap.



An example of two different types of valley floor and floodplain mapping in the Simonette River basin, Alberta (using 1 m LiDAR).

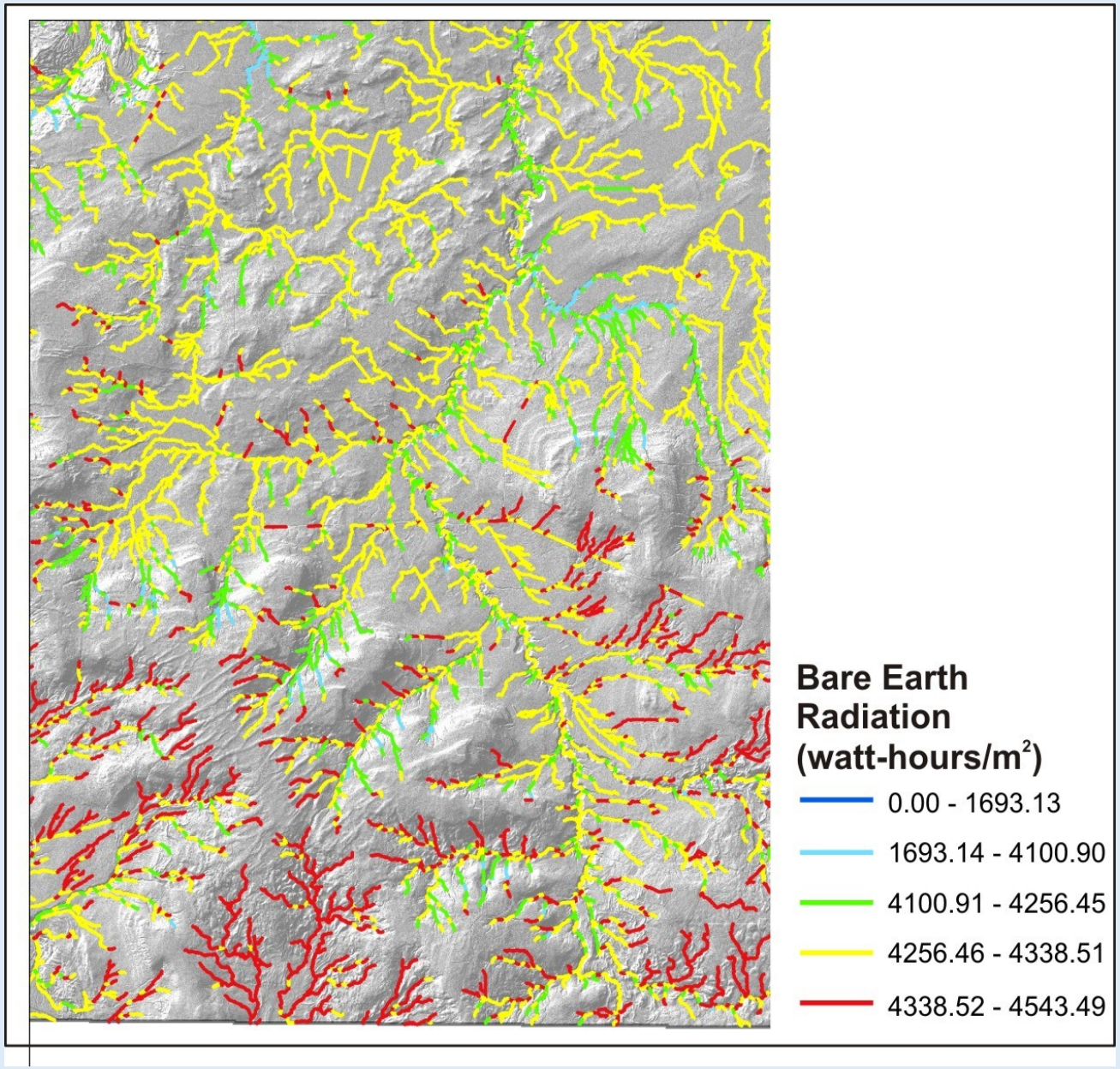


“Wet Areas Mapping” depth to water in the Simonette River pilot project area compared to floodplain mapping.

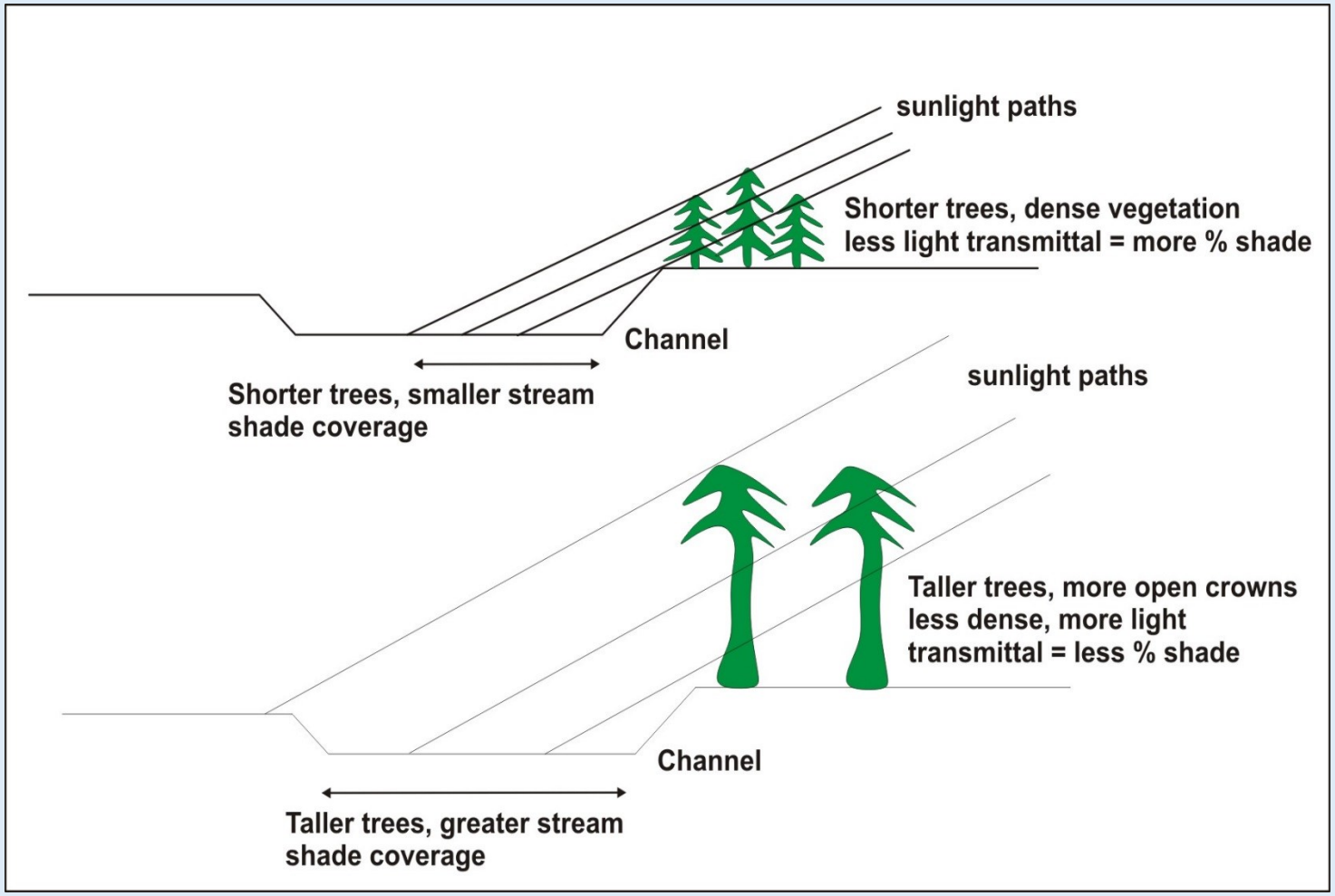


Bare earth radiation loading to streams in the Simonette River

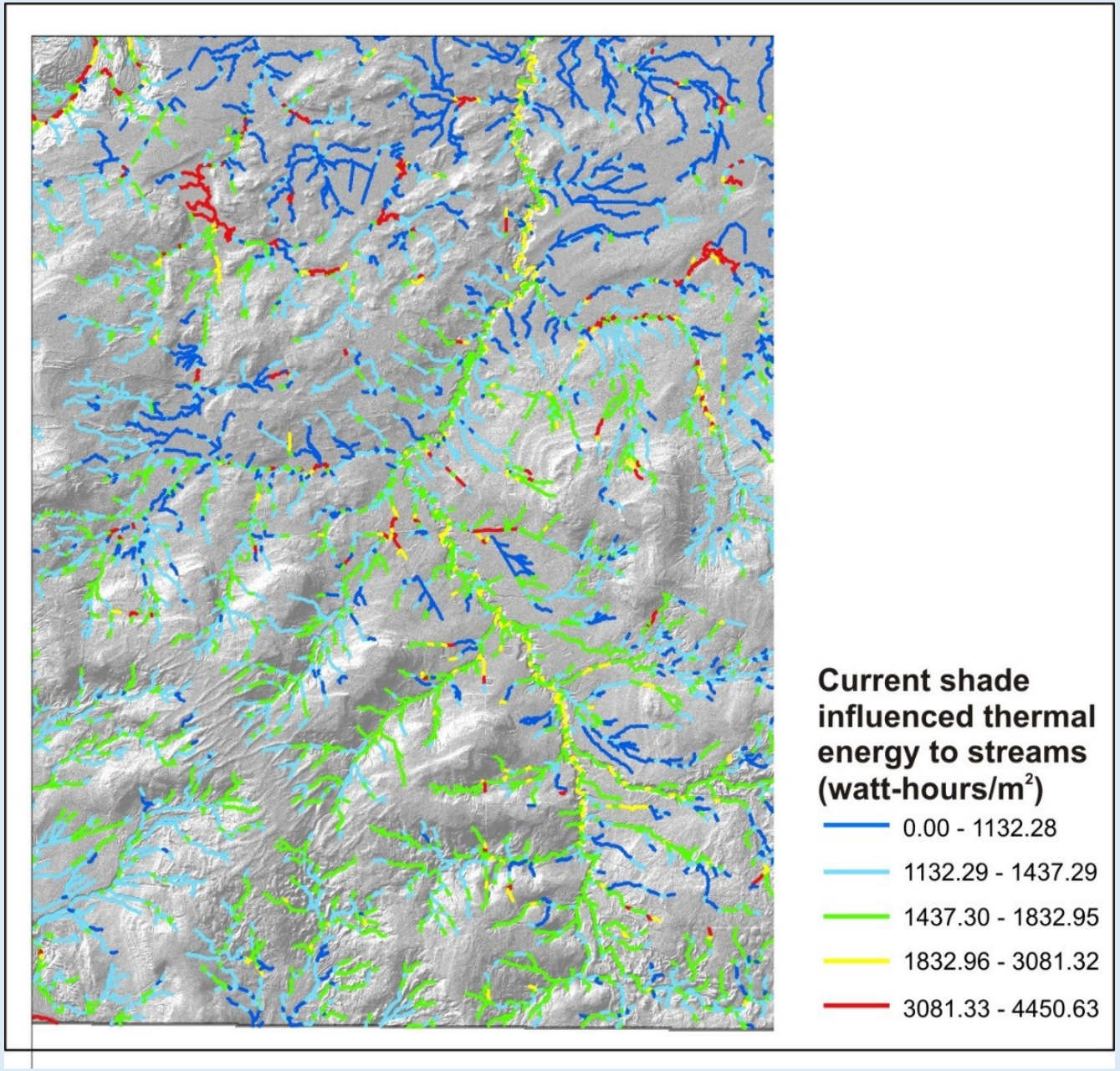
-latitude
-solar angle
-topographic shading
-stream width
-stream azimuth
-vegetation height
-vegetation width
-vegetation density



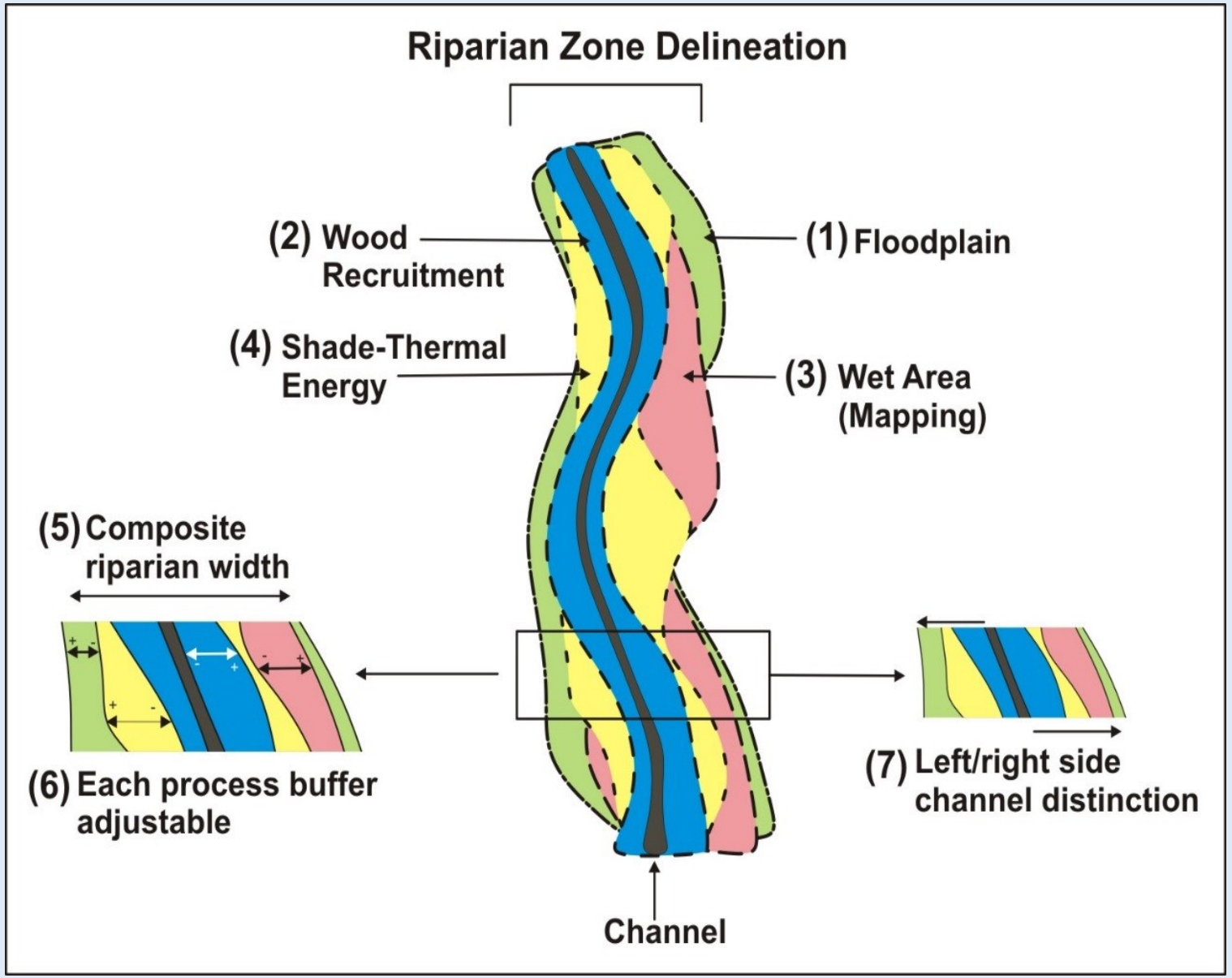
Shade model (Groom et al. 2011) uses basal area and tree height



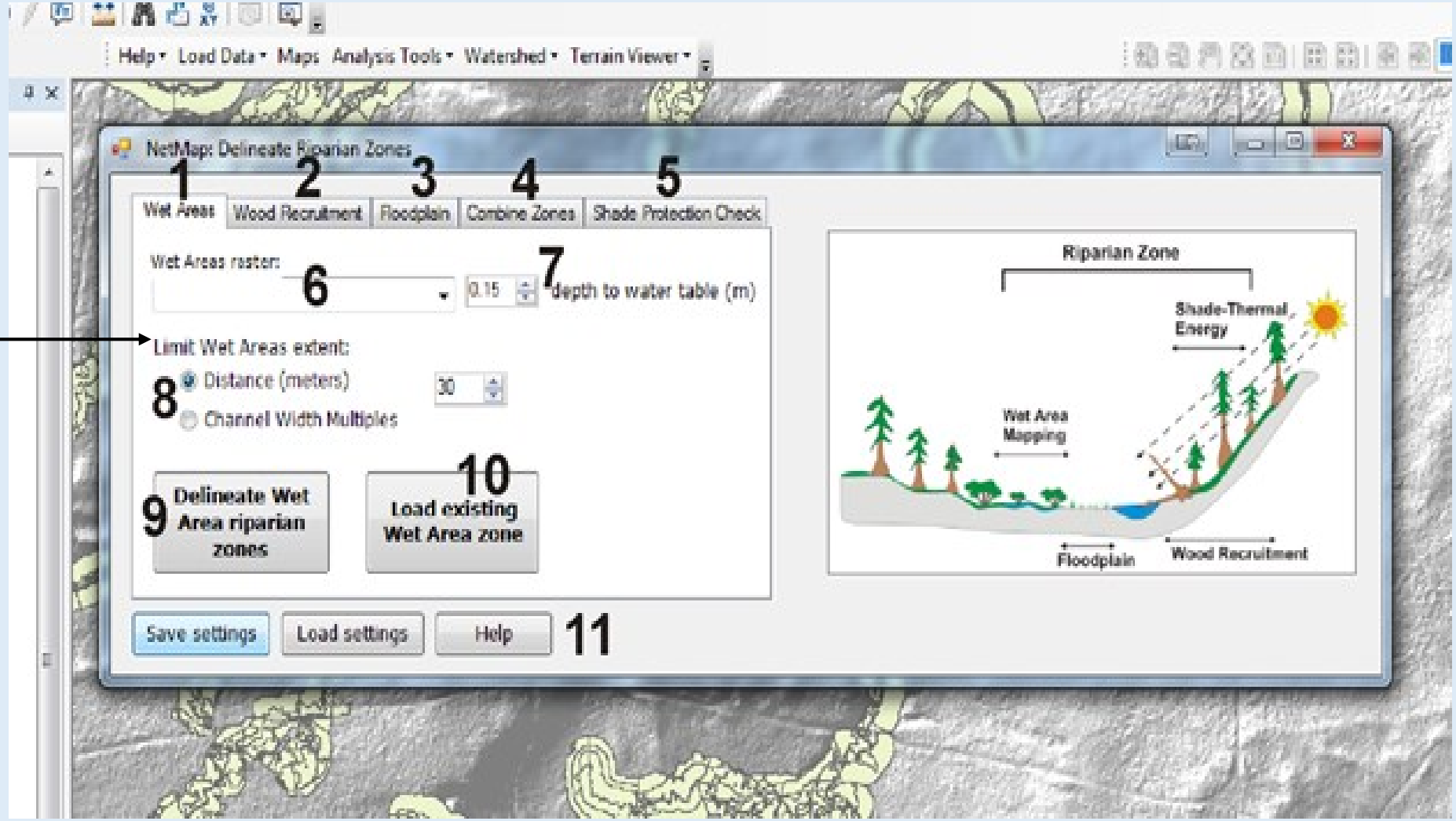
Current streamside shade influenced thermal energy to streams using basal area and tree height.



Spatially explicit, variable width riparian zone delineation model



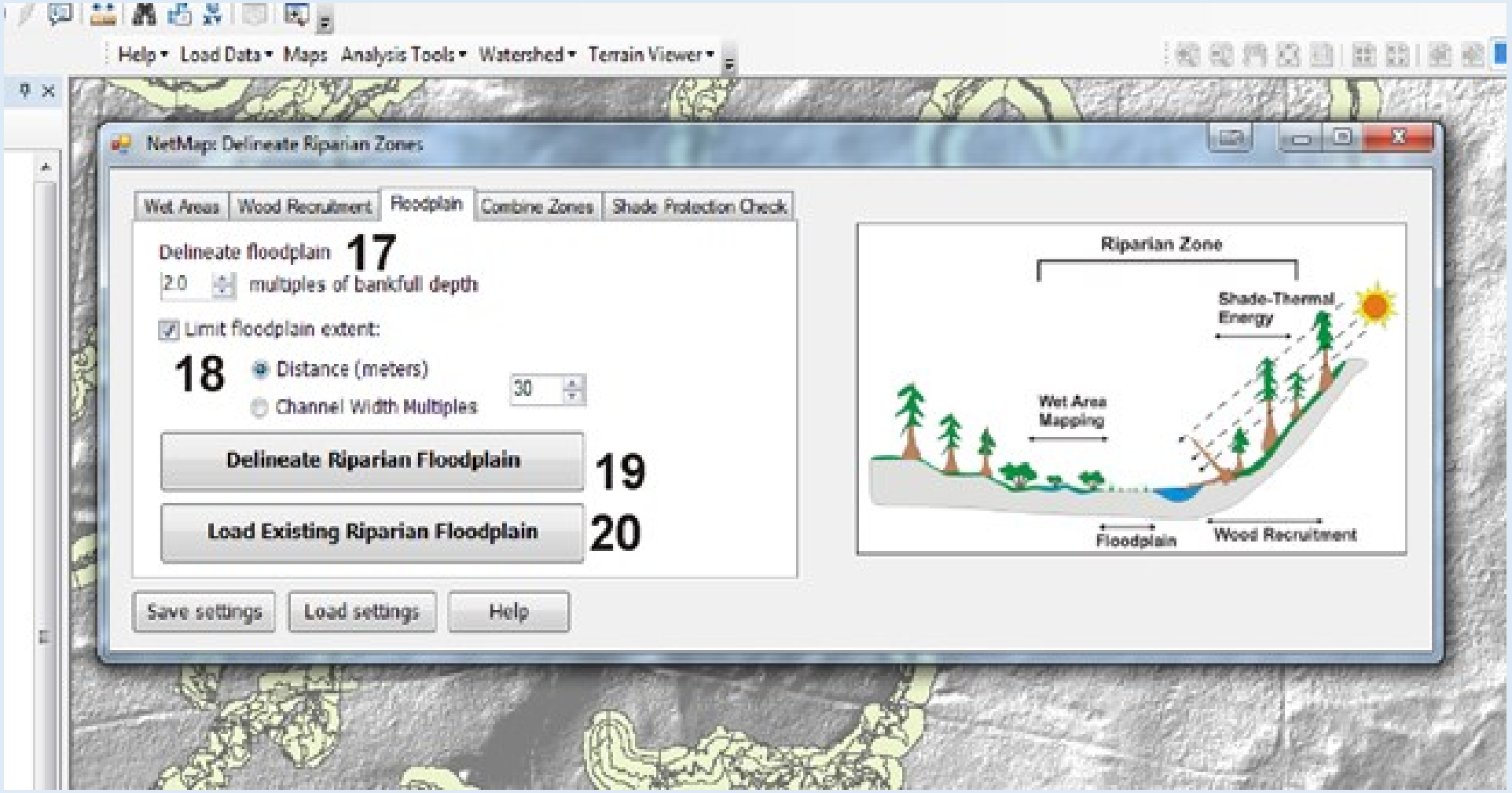
Model interface in NetMap Tools 1/5



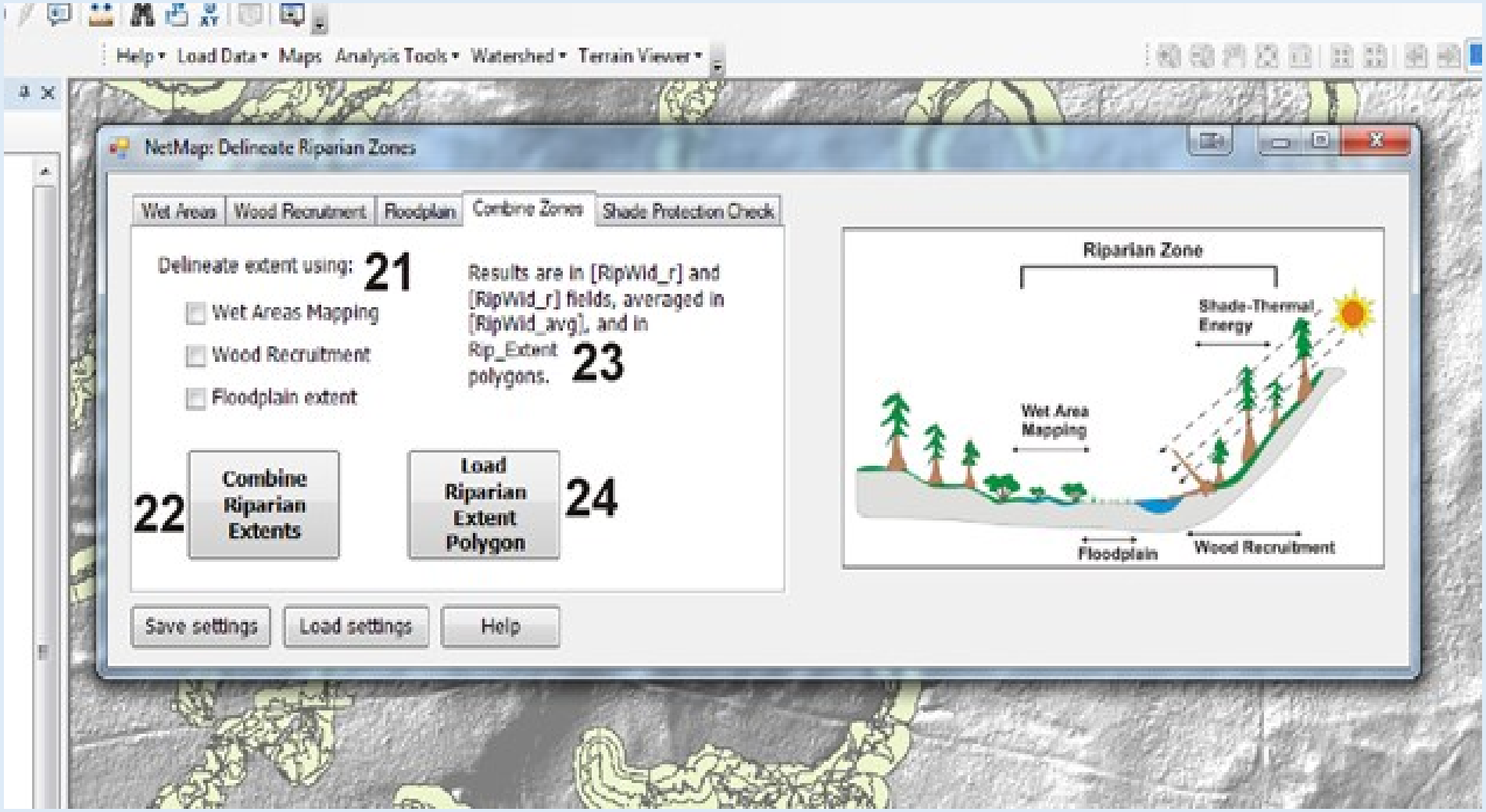
Limits can be set on lateral extent of delineated riparian zones

Model interface in NetMap Tools 2/5

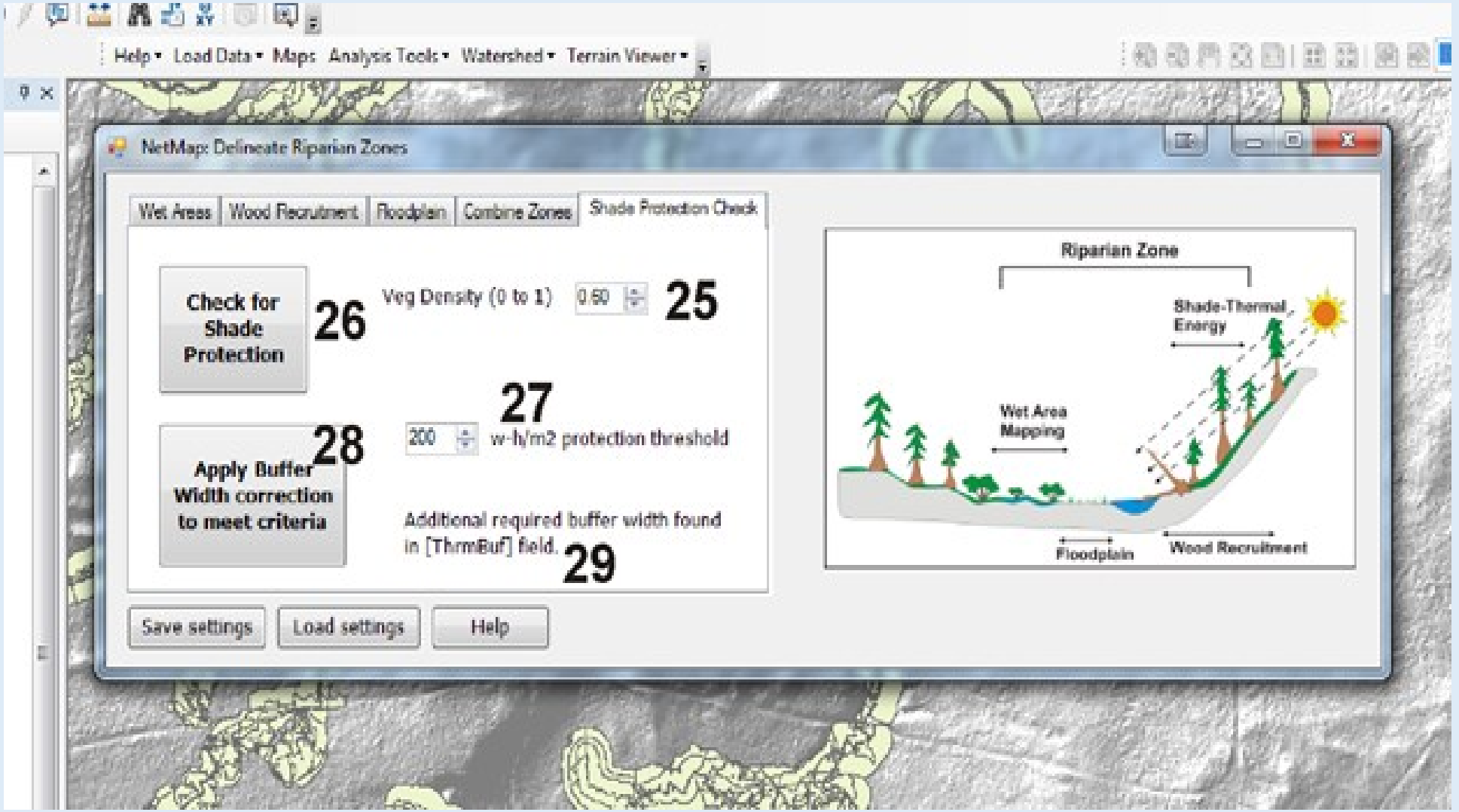
Model interface in NetMap Tools 3/5



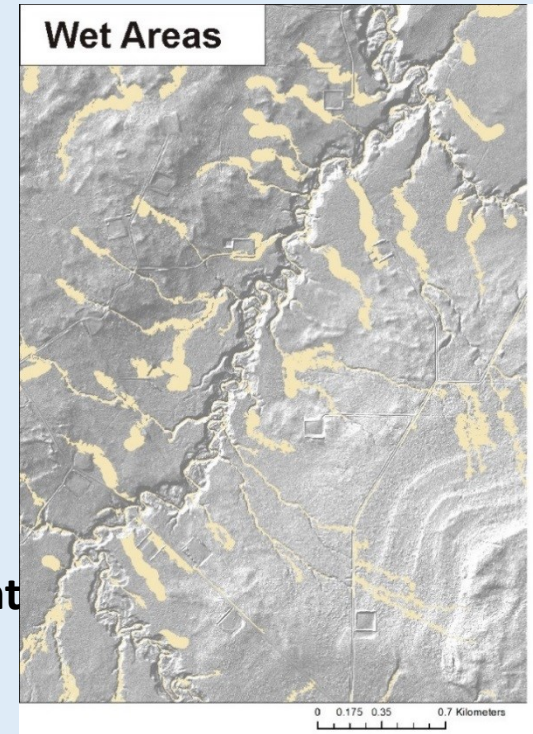
Model interface in NetMap Tools 4/5

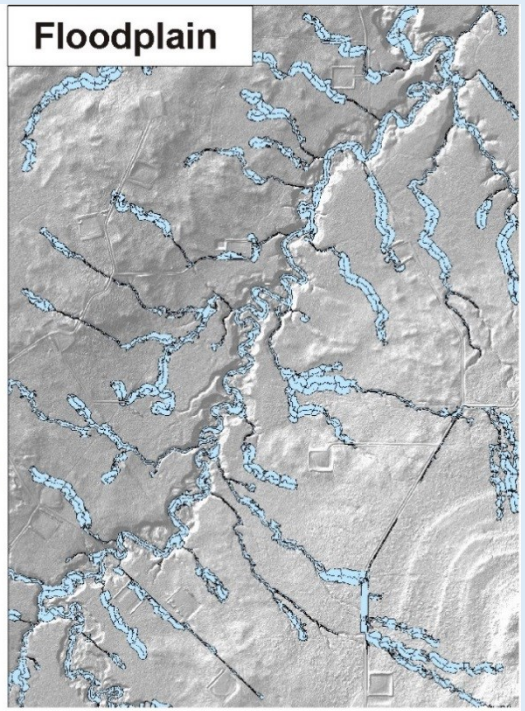


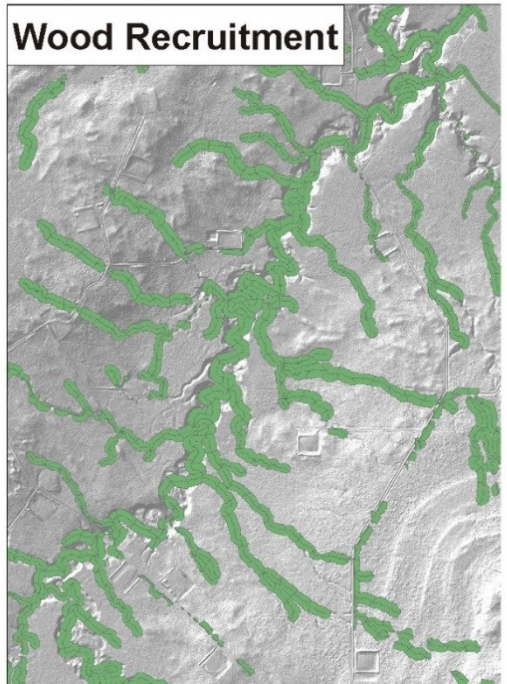
Model interface in NetMap Tools 5/5

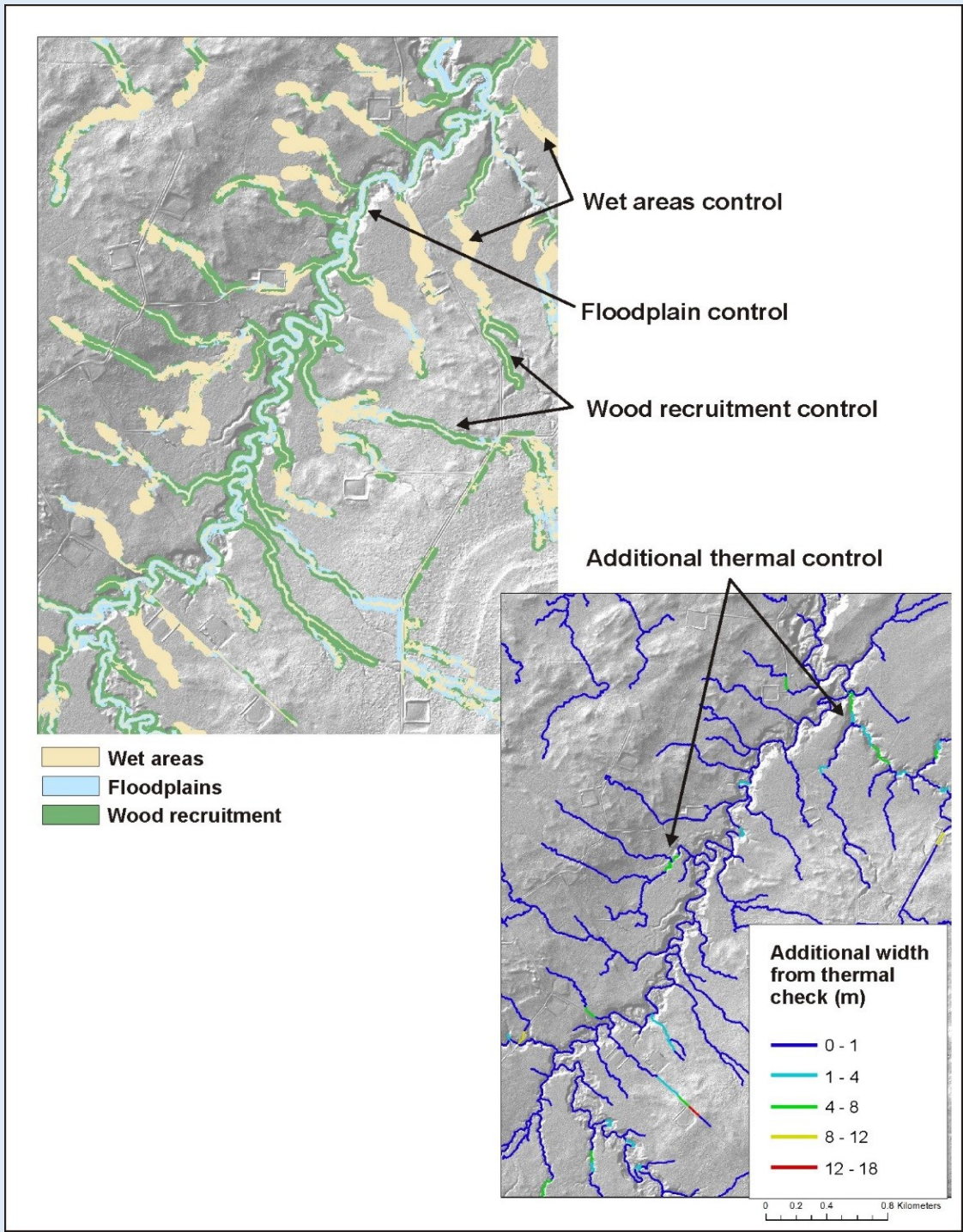


Example of spatially explicit delineation of riparian zones addressing four processes:
-wet areas
-floodplains
-wood recruitment
-thermal
and with limited lateral extent (35 m)

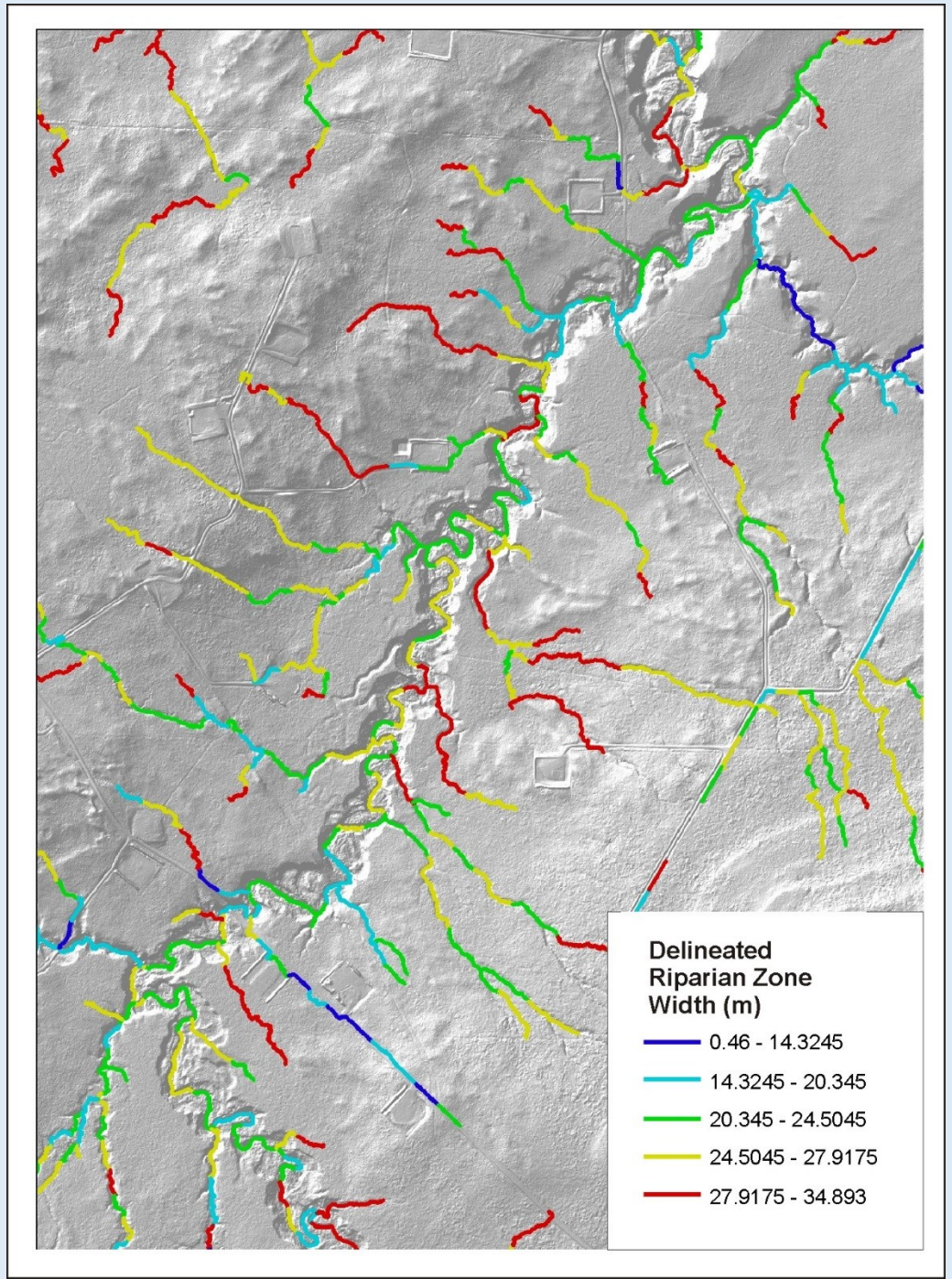




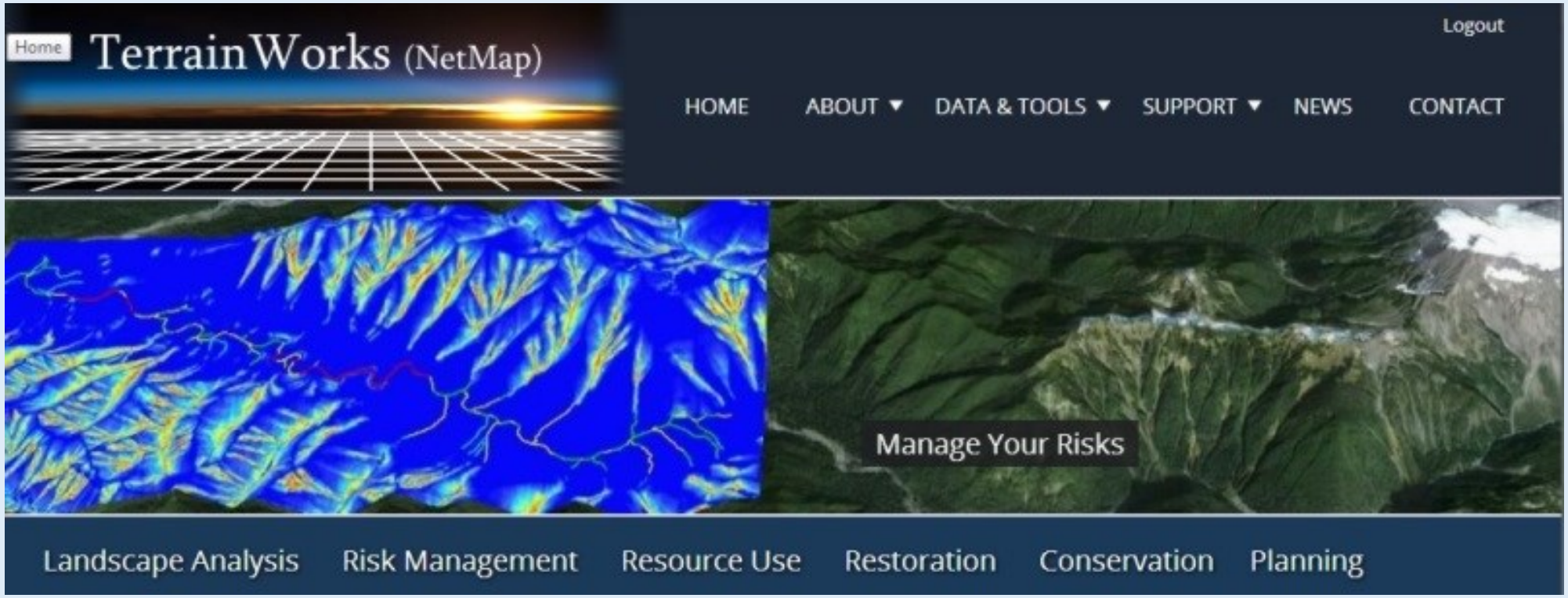




Predicted Spatial Variability in Delineated Riparian Zone in the Simonette basin



Presentation Complete



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