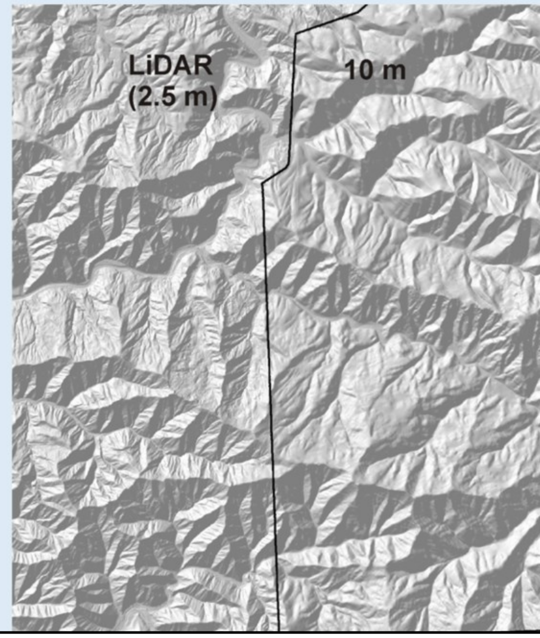
NetMap Watershed Characterization: Differences Between 10 m Digital Elevation Models and LiDAR DEMs

Topics

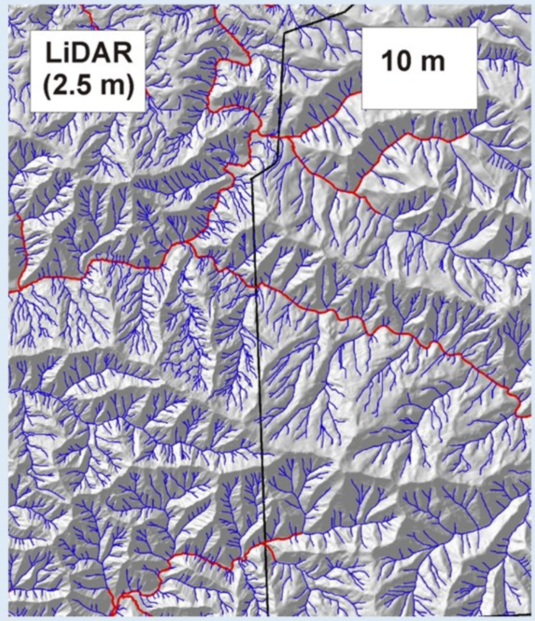
Take this self guided tour.

Topography



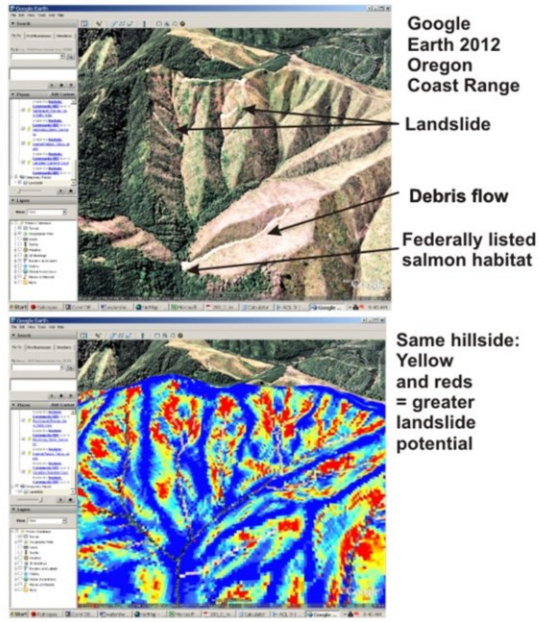
More topographic features can be resolved using LiDAR

Headwater channel density



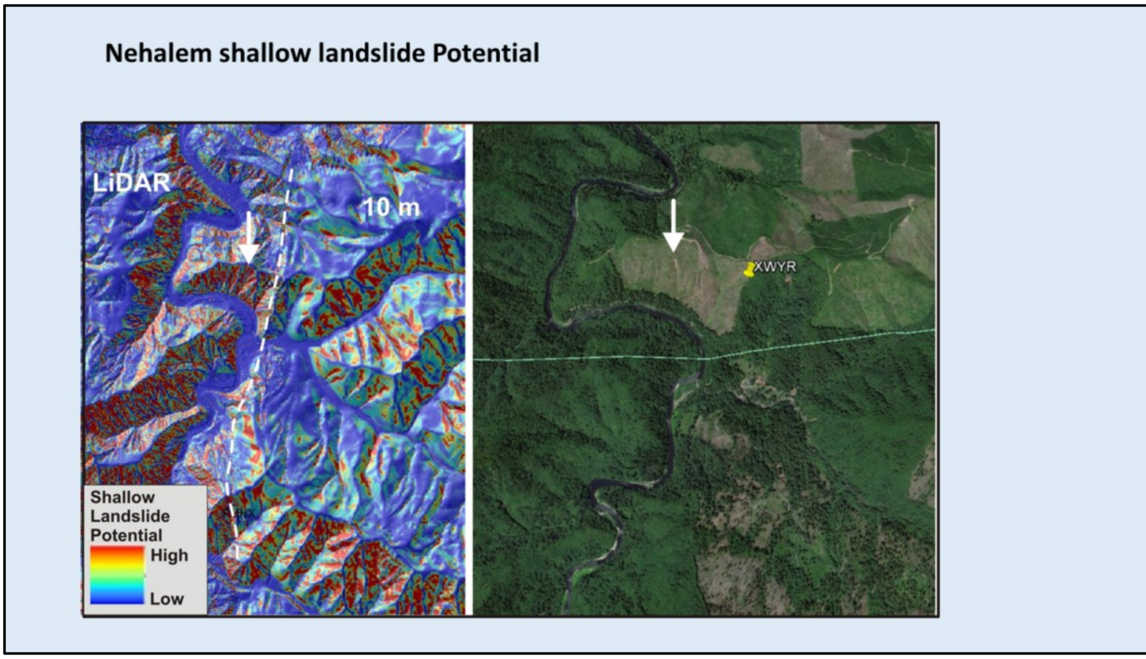
LiDAR reveals more headwater streams, many may be ephemeral.

Shallow landslide potential

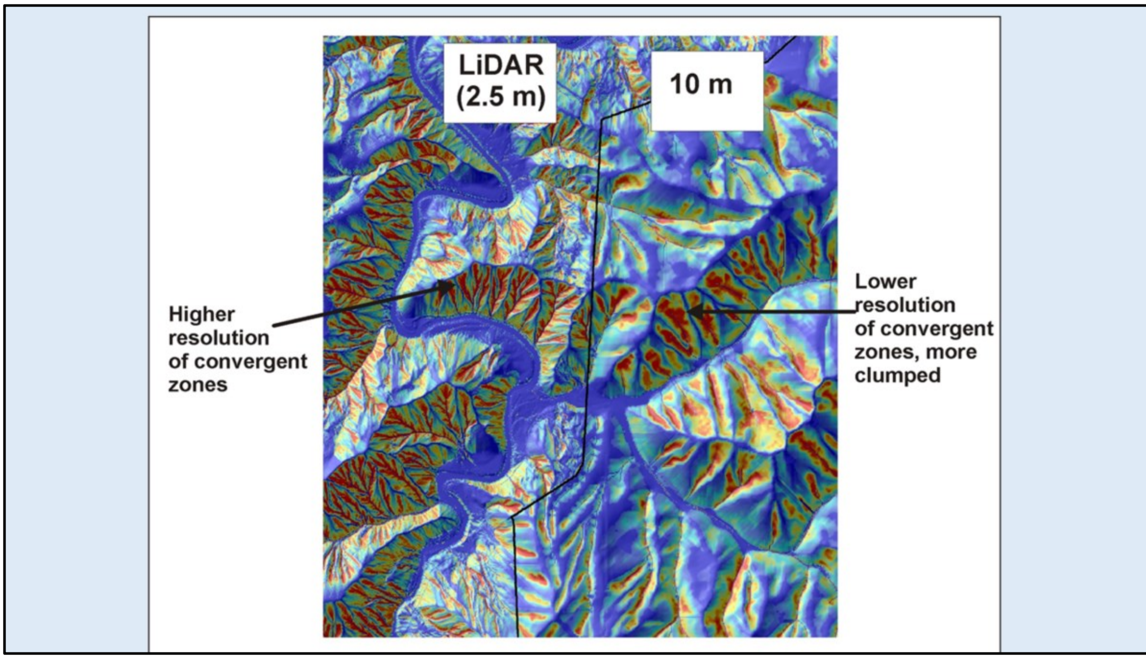


TerrainWorks (www.terrainworks.com)

Another important factor to consider in watershed restoration is landslide potential. Although not considered a restoration priority per se, information on landslide potential could be used in watershed management planning more generally, or restoration planning more specifically, about where erosion risk is the highest and what types of land uses can contribute to it, such as roads. The image above is from the Oregon Coast Range.

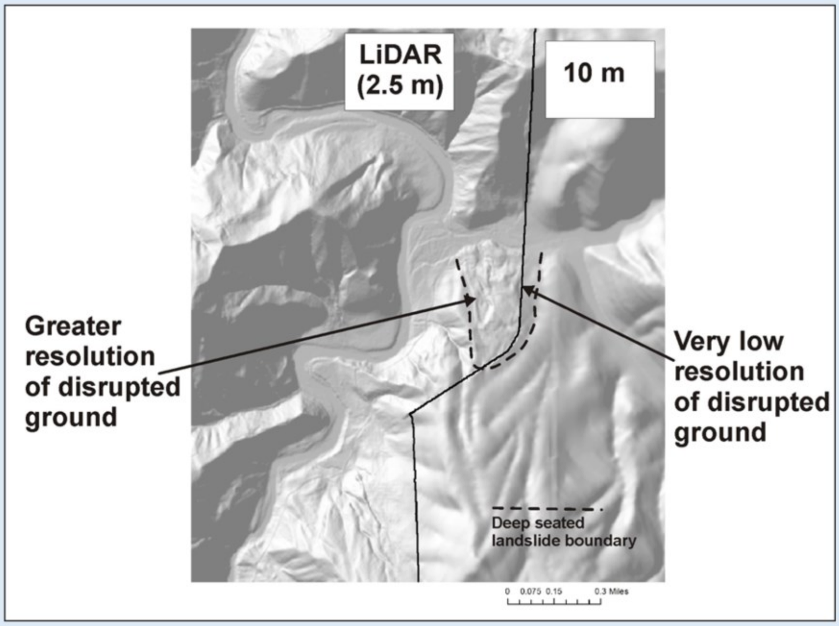


Here is an example of how shallow landslide potential is mapped using either 10 m or LiDAR DEMs in the Nehalem watershed. The LiDAR DEM when used with shallow landslide models provide a much higher spatial resolution, although the 10 m does an adequate job.



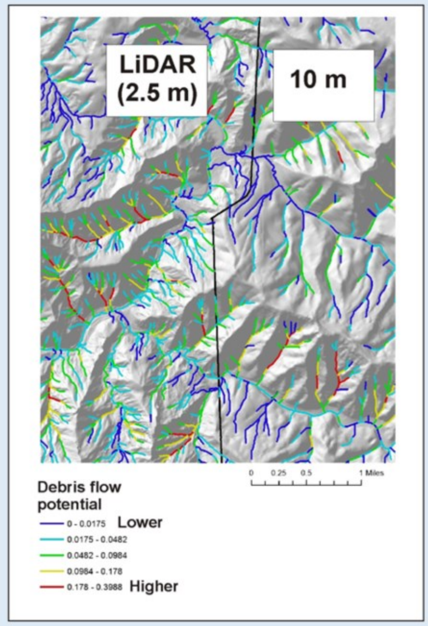
LiDAR can resolve individual convergent features (potential landslide sites), whereas the 10 m DEM provides a more coarse (clumped) resolution of the same sites.

Deep-seated landslide/ earthflow terrain

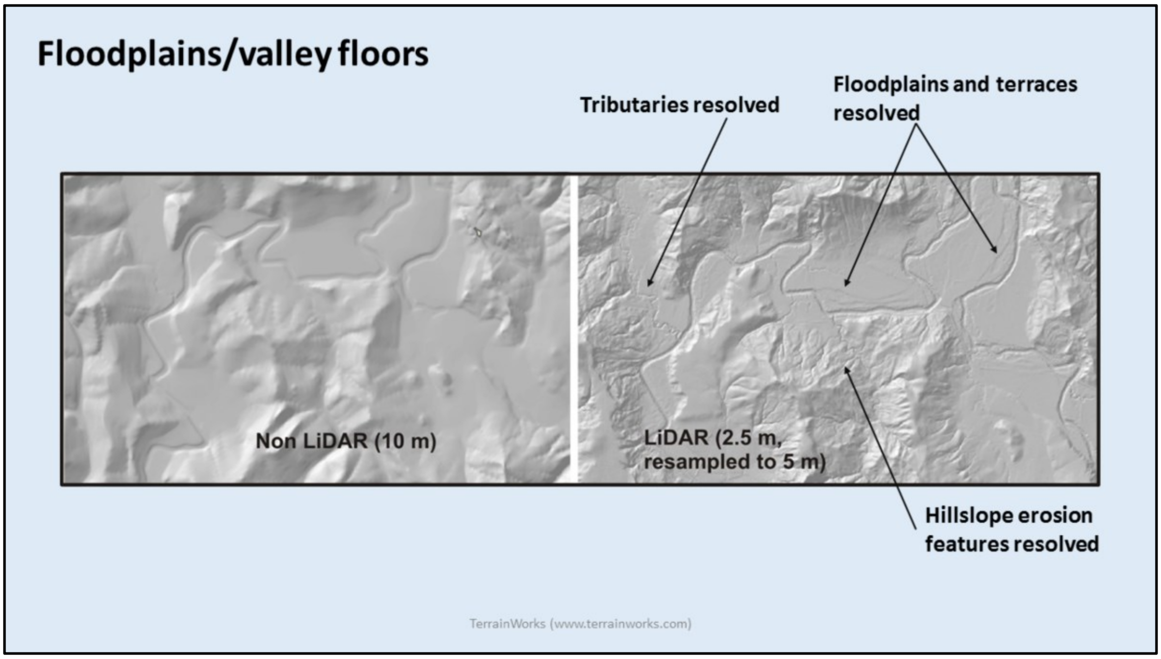


LiDAR can be used to better resolve topographic features associated with existing deep-seated landslides and earthflows (including features that are dormant)

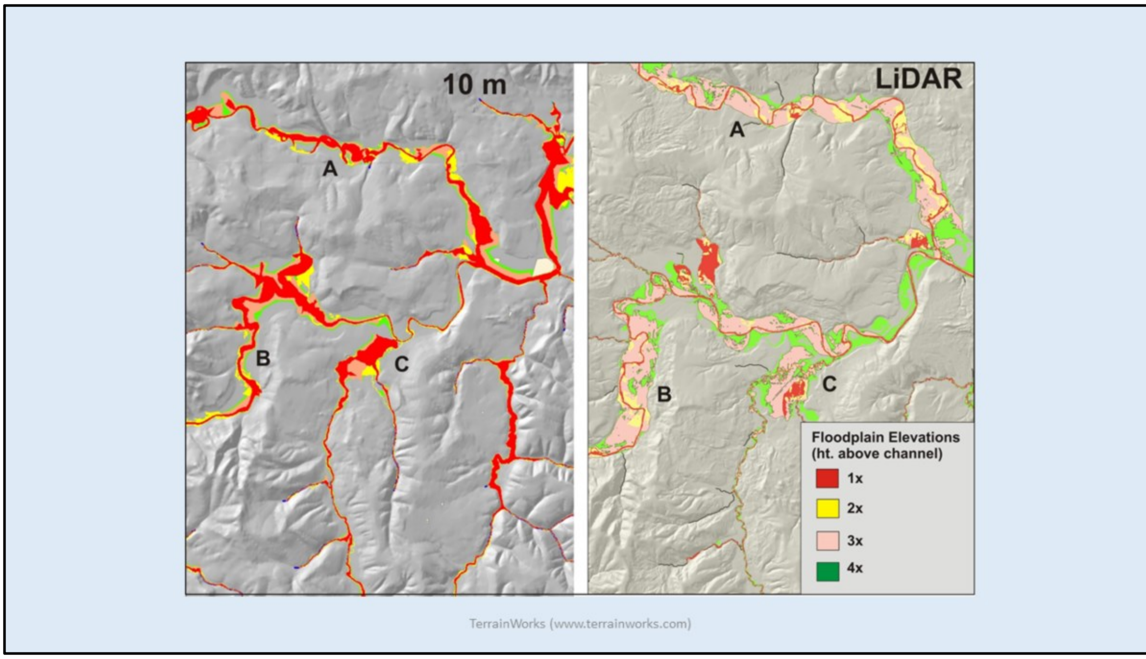
Debris flow potential



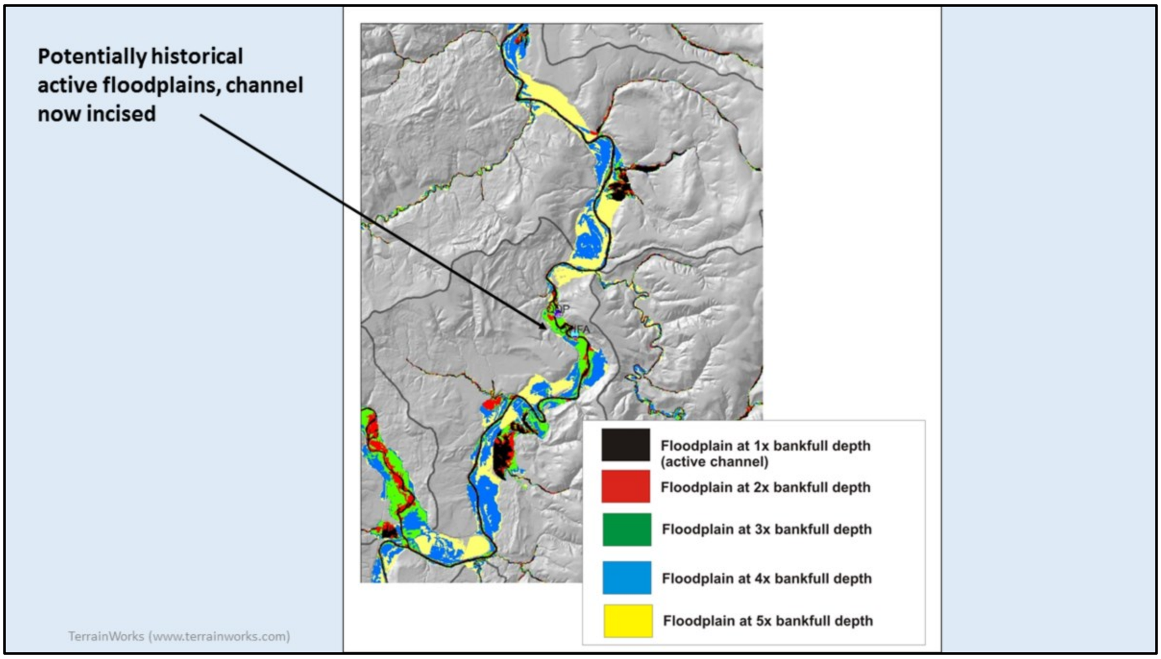
Using LiDAR resolved a higher density of debris flow potential channels; some of the headwater channels may be ephemeral.



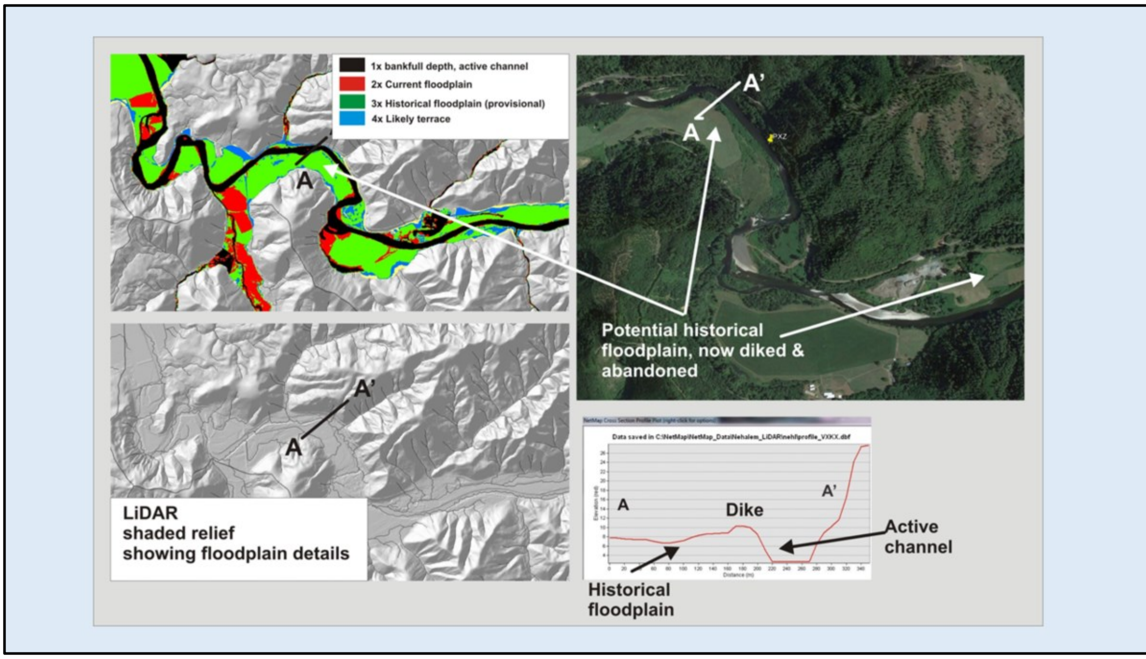
LiDAR improves mapping of floodplains and small tributary features



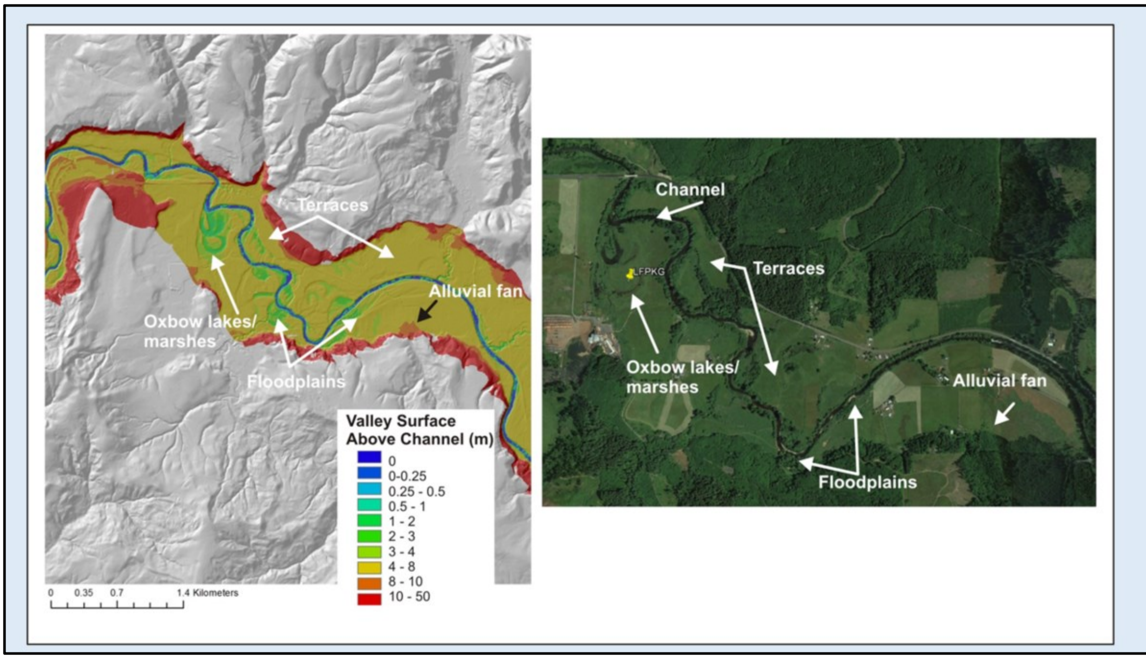
The LiDAR based floodplain maps provide considerably more detail (right panel, 1x, 2x etc. refers to valley elevations equivalent to one and two multiples of bankfull depths).



LiDAR can be used to resolve historically active floodplains, currently incised.



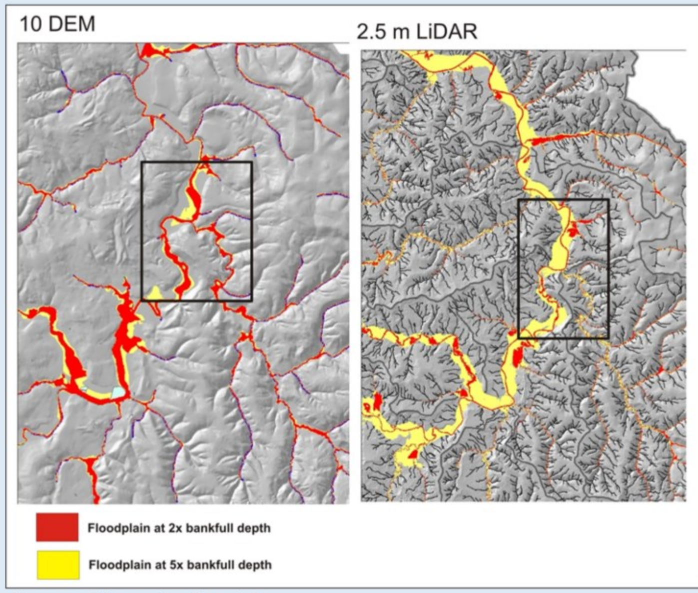
LiDAR can be used to resolve existing flood control dikes and abandoned (cutoff) floodplains.

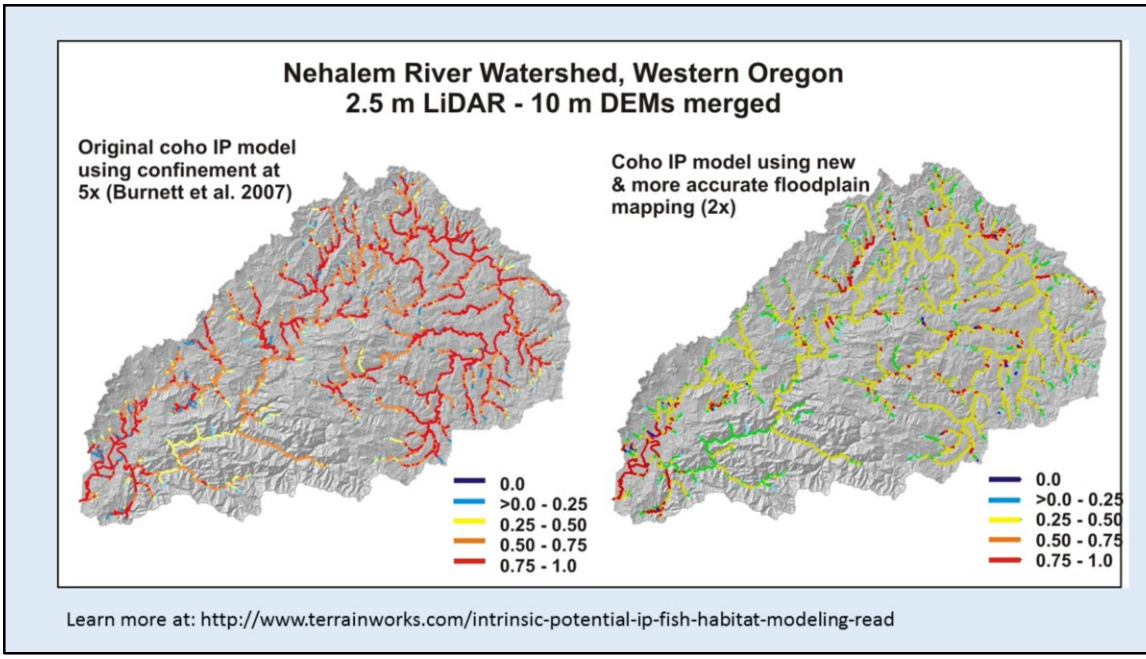


LiDAR is effective at identifying landforms including channels, floodplains, oxbow lakes, marshes, terraces and alluvial fans. This information could be used to help prioritize restoration projects, particularly those designed to reconnect channels with their floodplains.

Habitat modeling
(salmon intrinsic potential, coho)

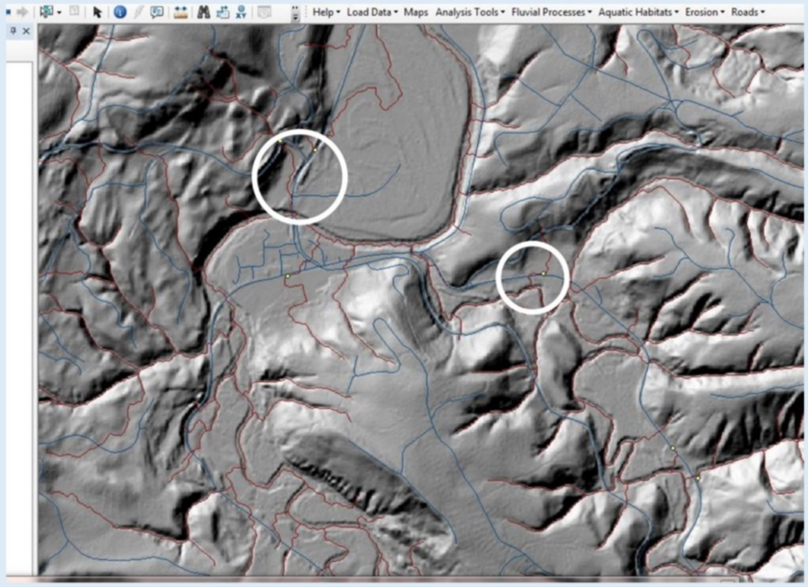
Visually compare, using
10 m and LiDAR DEMs, the difference between the spatial extent of the valley width at 5x bankfull depth and at 2x bankfull depth (the 2x valley surface is mapped using the latest technology available in NetMap along with LiDAR).
In the 10 m DEM, in most areas the 5x bankfull depth surface is wider than the 2x surface. This would result in less confined channels and in the IP model an over estimate of coho IP scores. The potential inaccuracies in predicted IP values using the 5x bankfull depth valley floor to calculate channel confinement using 10 m and LiDAR DEMs are shown in next slide
Use of older technologies can lead to a 100% overestimate in the highest IP scores (>0.75), a significant underestimate in moderate IP scores (0.4 - 0.75) and a larger proportions of low IP scores than actually exist.





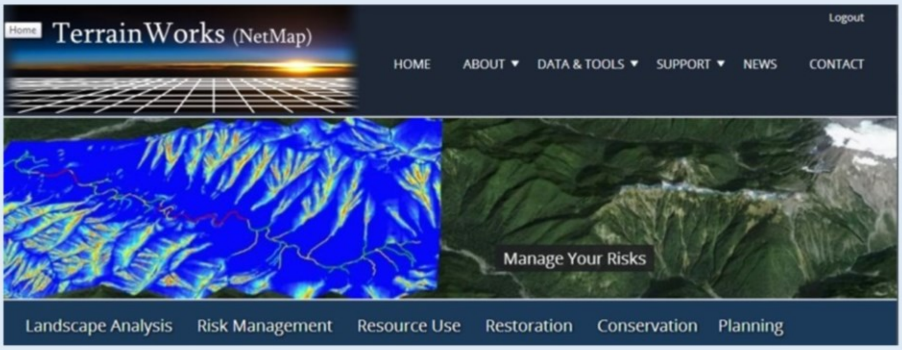
Use LiDAR with new floodplain mapping technologies to improve on the accuracy of intrinsic habitat potential modeling.

Roads in LiDAR DEMs are often seen as topographic features and cause drainage diversions that need to be corrected



TerrainWorks (www.terrainworks.com)

Roads are seen as topographic features in LiDAR and the resulting drainage diversions need to be addressed when building the synthetic river network



TerrainWorks creates customized virtual watershed datasets that work with NetMap tools including utilizing LiDAR where available. If a watershed or landscape only has partial LiDAR coverage, we merge LiDAR with 10 m digital elevation data to create a seamless DEM.

Learn more about NetMap virtual watersheds, watershed analysis tools, technical help and online tools at: www.terrainworks.com. Contact us with questions, we are here to help.