Transect Method

Transect measurements can be made manually or in GIS. The advantage of digitizing transects in GIS is that it allows for the systematic measurement of spatial and temporal channel change without introducing the bias that typically occurs from manually measuring specific features, such as channel bends. Step 1 of the polygon method applies here also.

Step 1: Scan and register remote sensing data (aerial photographs, maps) into GIS and rectify (described in polygon method)

Step 2: Identify locations of the active channel transect and floodplain transects. These two transects are used in conjunction. The active channel transect is the sum of the widths of the actively flowing channels plus the unvegetated bars. The floodplain transect is defined as the Holocene valley bottom, which can be identified using geology maps and DEMs or LiDAR (Holocene is defined as the time period encompassing the last 8,000 years to the present).

Floodplain transects and active channel transects remain stationary for each set of data when tracking rates and directions of channel migration over time. The transects should be chosen to characterize the relevant reach features such as lateral migration points, deposition (bars), and side channels for all years.

Step 3: Digitize floodplain transects perpendicular to the centerline of the valley bottom. These transects are used to measure and delineate broad-scale attributes, such as:

- channel sinuosity
- valley width
- active channel width(s)
- location of the primary active channel
- locations of historical channels and secondary channels

Step 4: Digitize active channel transects perpendicular to the centerline of the primary low-flow (widest wetted) channel at discrete increments scaled to the size of the channel.

Active channel transects are used to quantify the rate and direction of channel movement and to calculate erosion, deposition, and avulsion over the period in question. Measurements are taken from one data set to the next to calculate rates and directions of channel movement over the course of the timeline being studied.

Step 5: Overlay the centerline of the active channel transects with the centerline of the floodplain transects. For each transect, measure:

- Width and area of the primary low-flow channel and the width, area, and number of other connecting channels, such as side channels

- Width and area of unvegetated gravel bars (e.g., filled-in side channels or sloughs)
- Width and area of vegetated patches on gravel bars (vegetation that can not resist flooding)
- Width and area of permanently vegetated islands
- Width and area of the floodplain with high flow and relic channels
- Width and area of isolated (from the main channel) or partly isolated water bodies (e.g., oxbow lakes). Isolated or partly isolated water bodies are defined by their connectivity to the primary low-flow channel: isolated water bodies are disconnected at both ends, whereas partly isolated water bodies are only disconnected at one end.
- Width and area of LWD debris where visible

Erosion rates developed in the study can be used to extrapolate future erosion rates. The end product of this method is a map that depicts the HMZ (Figure) within the valley bottom that is accompanied by estimates of erosion rates, both of which provide a basis for evaluating future trends in channel movement.

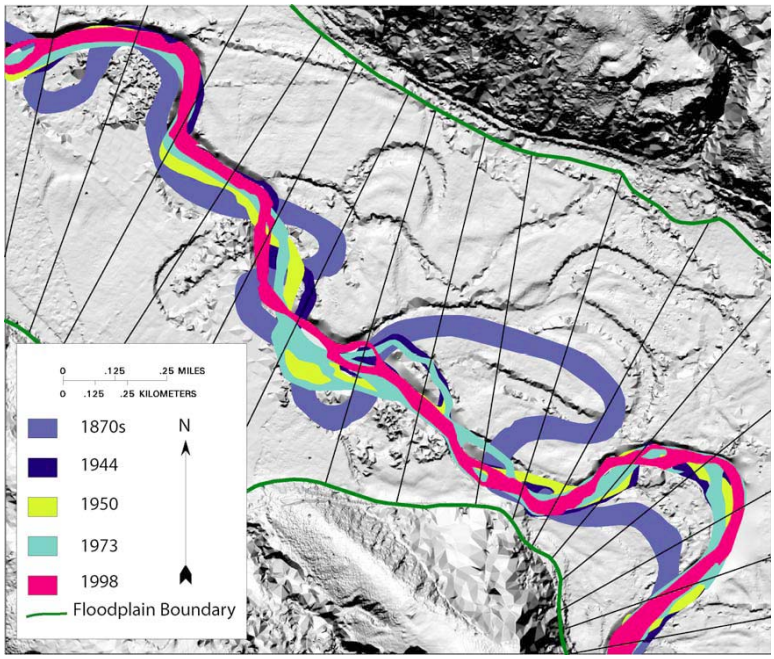

Figure 6: The HMZ is depicted within the valley bottom as the outermost extent of all documented historical channel locations. The relic channels on the LiDAR image that are not included in the HMZ were occupied by the channel prior to the historical record; therefore they are not included in the HMZ. The HMZ is depicted within the valley bottom as the outermost extent of all documented historical channel locations. The relic channels on the LiDAR image that are not included in the HMZ were occupied by the channel prior to the historical record; therefore they are not included in the HMZ. (Graphic adapted from Jim O'Connor, source Rapp and Abbe 2003).