Floodplains Key to the Health of Lake Champlain

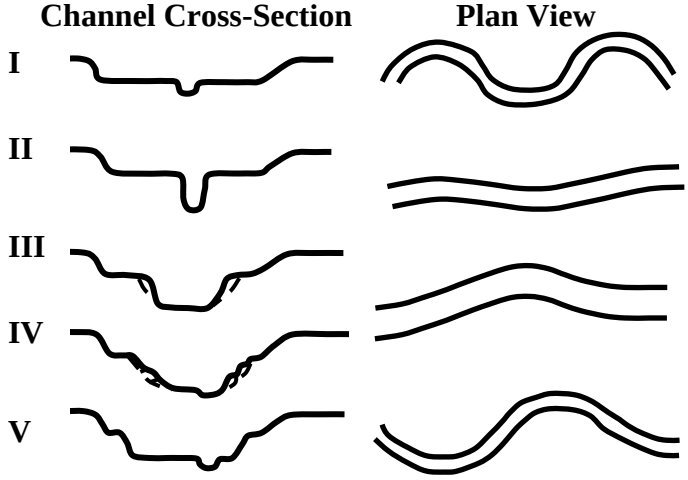
75% of Assessed Stream Miles in Vermont Eroding due to Floodplain Loss

The Data Tells the Story

Stream geomorphic assessments completed as part of the Clean and Clear Program are telling a recurring story. Since European settlement, repeated watershed and stream channel modification (i.e., deforestation, ditching, dredging and armoring) has led to a widespread loss of floodplain function. Changes to the shape of river channels or changes in the inputs of water and sediment have led to imbalance, causing adjustments in river and floodplain geometry until balance is re-established. Adjustments resulting from natural changes have been largely magnified during the past two centuries by human-imposed alterations to the depth and slope of rivers, related to intensive watershed and riparian land uses.

Nearly every Vermont watershed has streams "in adjustment." Streams and rivers have become confined to deeper, straighter channels and no longer have access to historic floodplains.

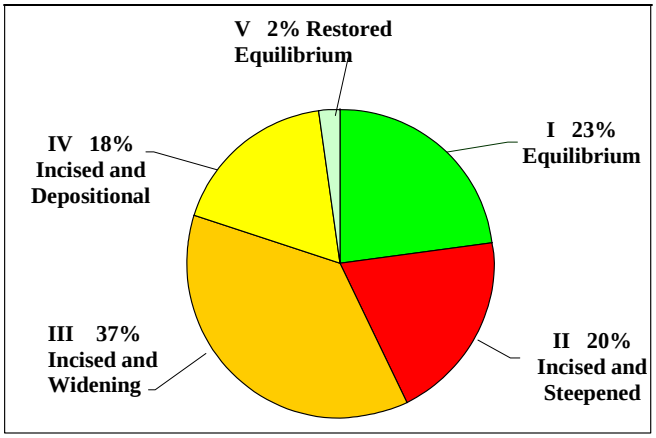
The increased power of larger floods, contained within the channel, has led to higher rates of bed and bank erosion. The average $18-20 million being spent annually in Vermont to keep rivers disconnected from their floodplains and static in the landscape, has become unsustainable. Erosion hazards and flood losses are increasing. River management has become a vicious cycle where flood recovery and structural constraints (i.e., channel straightening, berming and rip-rapping) have led to developments along rivers where they formerly meandered and flooded. Inevitably, and often decades later, a large flood occurs, structures fail, and the cycle repeats itself. Economic, social, and environmental costs are increasing.



Channel evolution process showing channel down-cutting or incision in Stage II (cross-section), widening through Stages III and IV, and floodplain re-establishment in Stage V. Stages I and V represent equilibrium conditions. Plan view shows straightening and meander redevelopment that accompany cross-section changes. A flood-driven process taking place over decades.

Evolution Stage	Number of Miles	Percent Length
I	217.8	23%
II	183.5	20%
III	351.7	37%
IV	165.7	18%
V	21.3	2%
Total	939.9	100.0%

VT DEC Stream Geomorphic Assessment Results (2002-2007) explain the *State of Vermont Rivers.* Channel Evolution Stages II through IV represent departures from equilibrium where floodplain access and attenuation functions are reduced.



Water Quality Implications

If this cycle is not broken, land-based enterprises will suffer economically because, in addition to erosion hazards, channelization leads to a loss of sediment storage and a net export of life-giving soil and nutrient from a watershed. Rivers that have down cut and lost access to their floodplains will erode their banks until new floodplains are formed. During the early stages of this channel evolution process, floods remain within deepened channels, and have much more power to erode and carry away anything that enters them. Without floodplains and meanders, it is often the lakes and reservoirs that are the first quiet waters in which rivers deposit the eroded soil and nutrient. This process helps to explain the increasing enrichment and algae along the shores and bays of Lake Champlain. The Clean and Clear goal of achieving stream stability to benefit the Lake is now being aggressively pursued through landowner and municipal incentives to protect and restore stream equilibrium. Floodplains are essential to stable streams and sustainable water quality management.