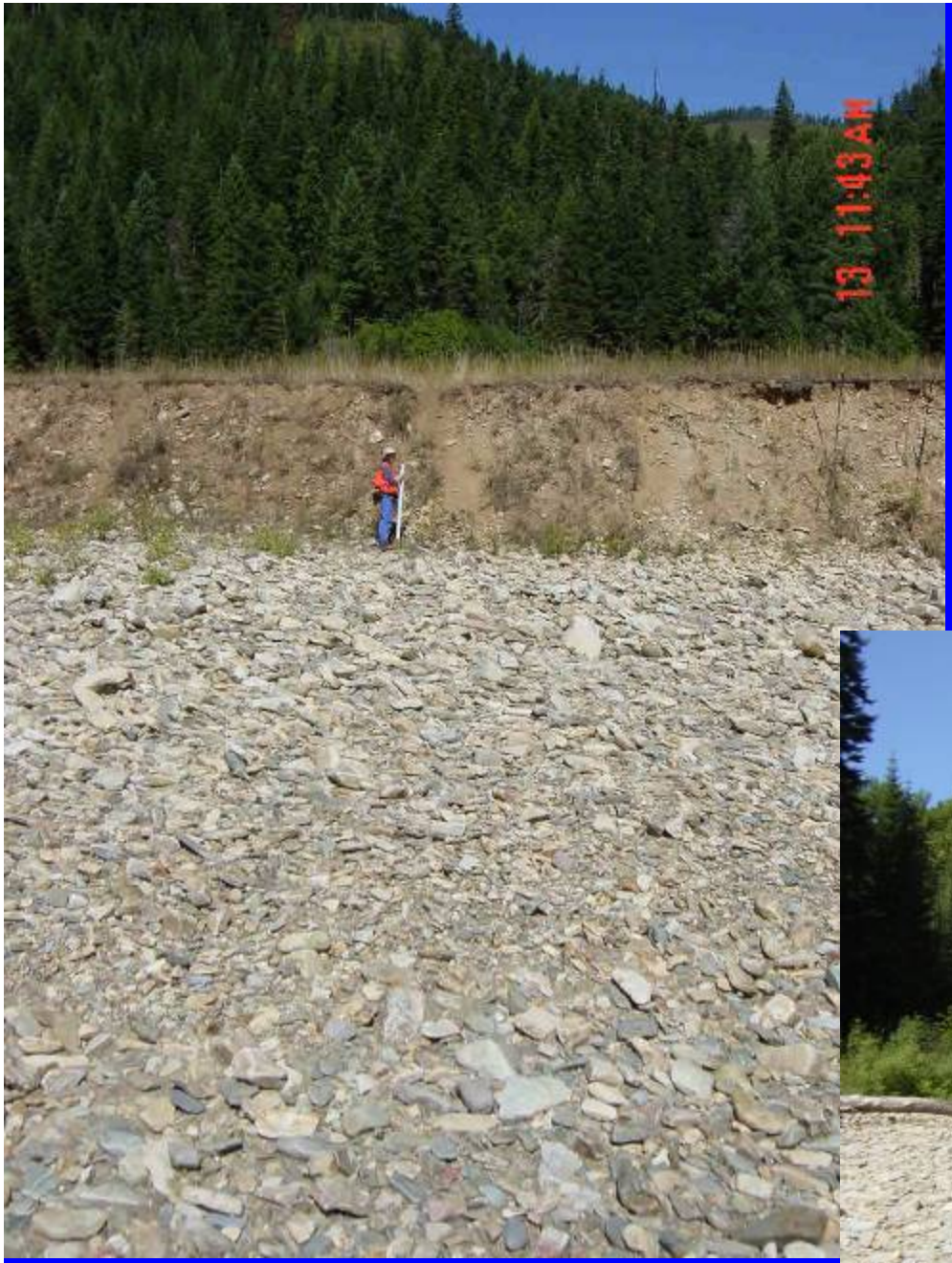
Preliminary Channel Results

North Fork Coeur d'Alene River

Watershed-wide results

- **Channels widened in response to high coarse sediment load**
  - **was most extreme in 1930s through 1980s in many locations**
  - **channels had narrowed by 1996 in most response zones**
- **Current channel erosion rates are far lower than past rates but coarse sediment is still in transit**
- **Mined watersheds have had the most severe and persistant channel response to sediment load (Prichard/Eagle/Beaver creeks)**

Dredge spoils and valley wall landslides – Prichard Cr.

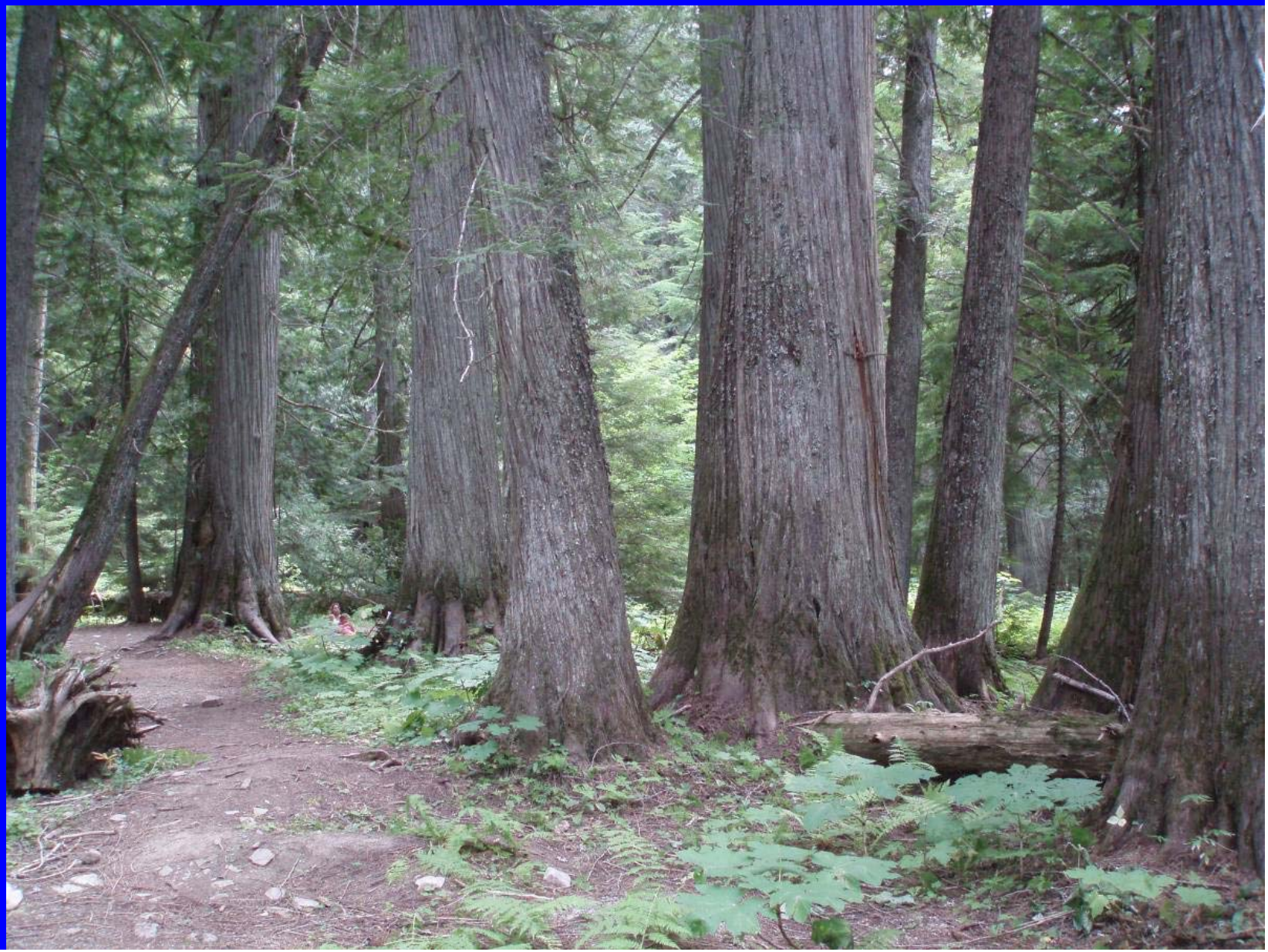


Eagle Cr. below forks

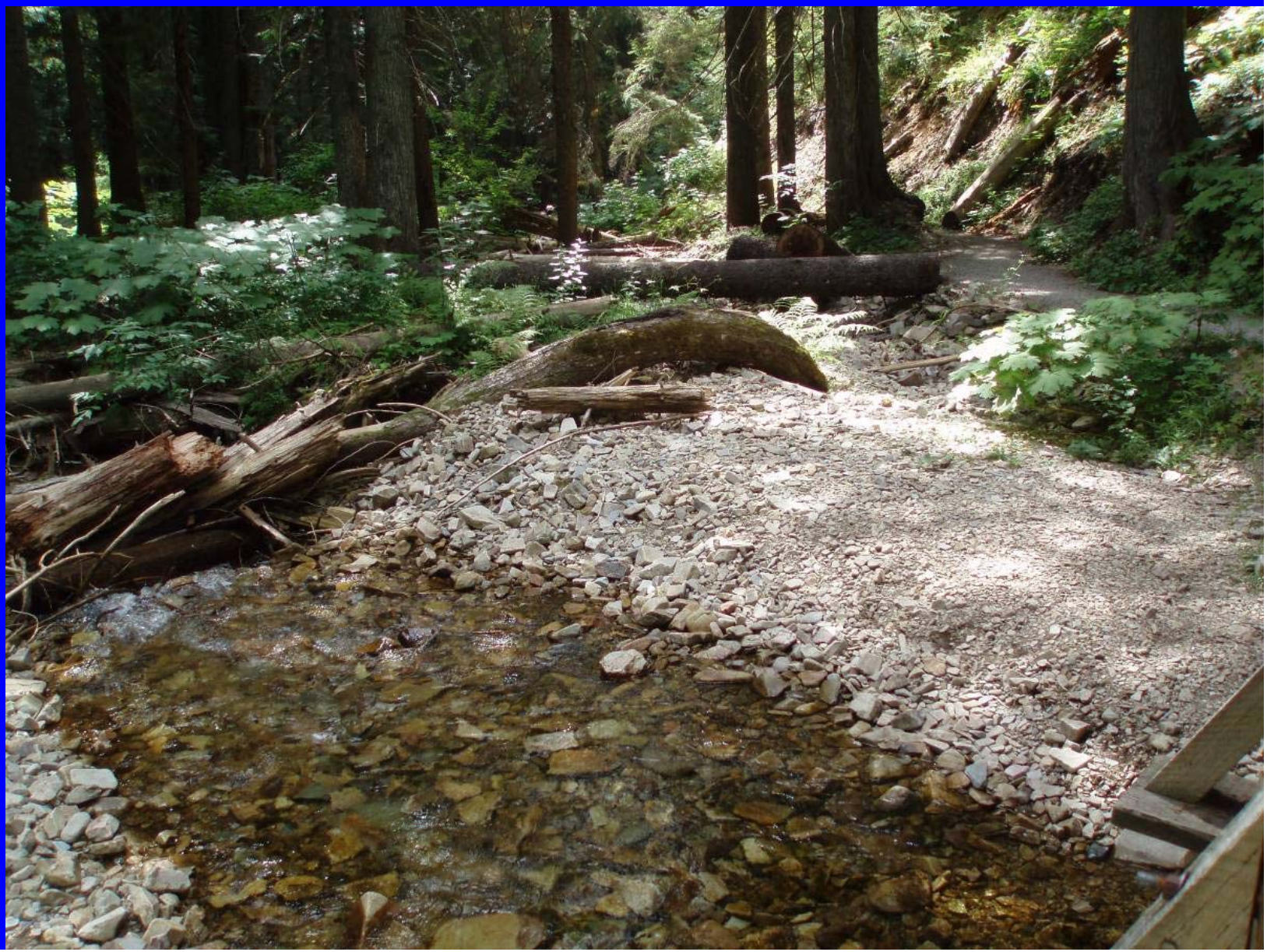
Indications of high background coarse sediment load

- **Independence and Trail Creeks**
  - **burned in early 20th century**
  - **little to no logging or roading**
  - **mainstem channel widening response on a similar scale and timing as densely-roaded, logged sub-basins**
- **Local geology appears to yield a relatively high background rate of cobbles and gravel from streamside cliffs (especially Wallace Formation?)**

Grove of the Patriarchs – old-growth cedar forest Eagle Creek headwaters

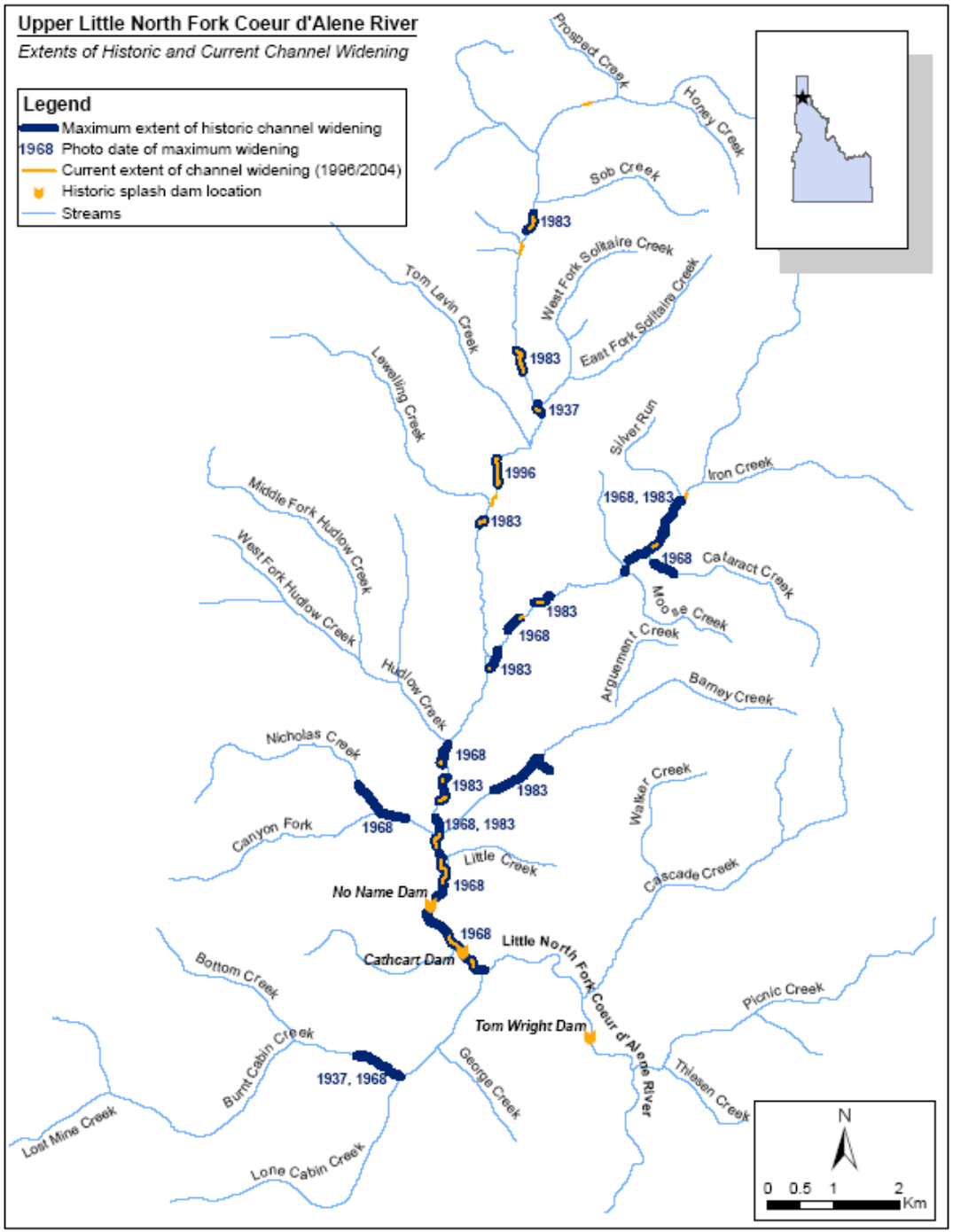


Grove of the Patriarchs – old-growth cedar forest Eagle Creek headwaters



2 detailed study areas

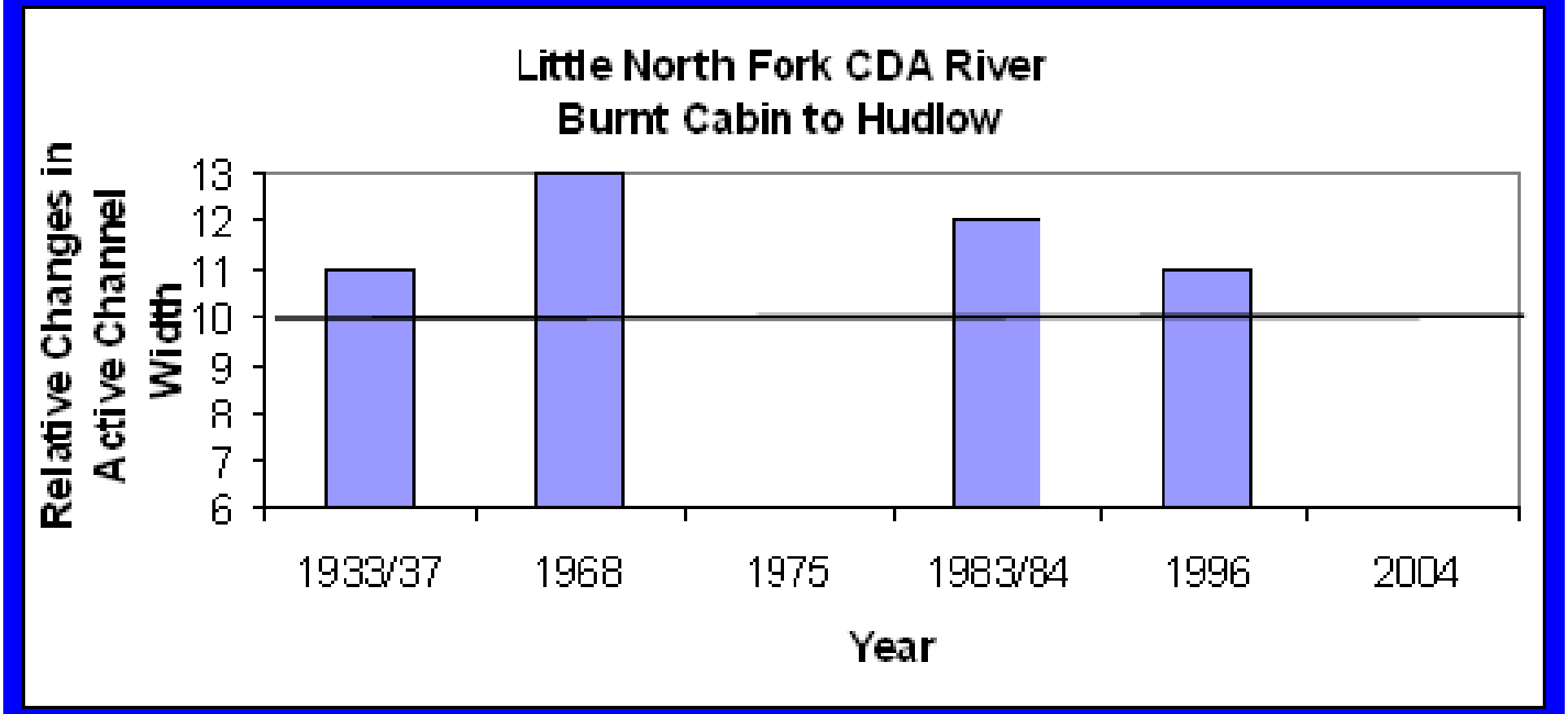
- **Upper Little North Fork above Burnt Cabin Creek**
- **Big Elk Creek (Tepee Creek headwaters)**



Historic Channel Widening Map:

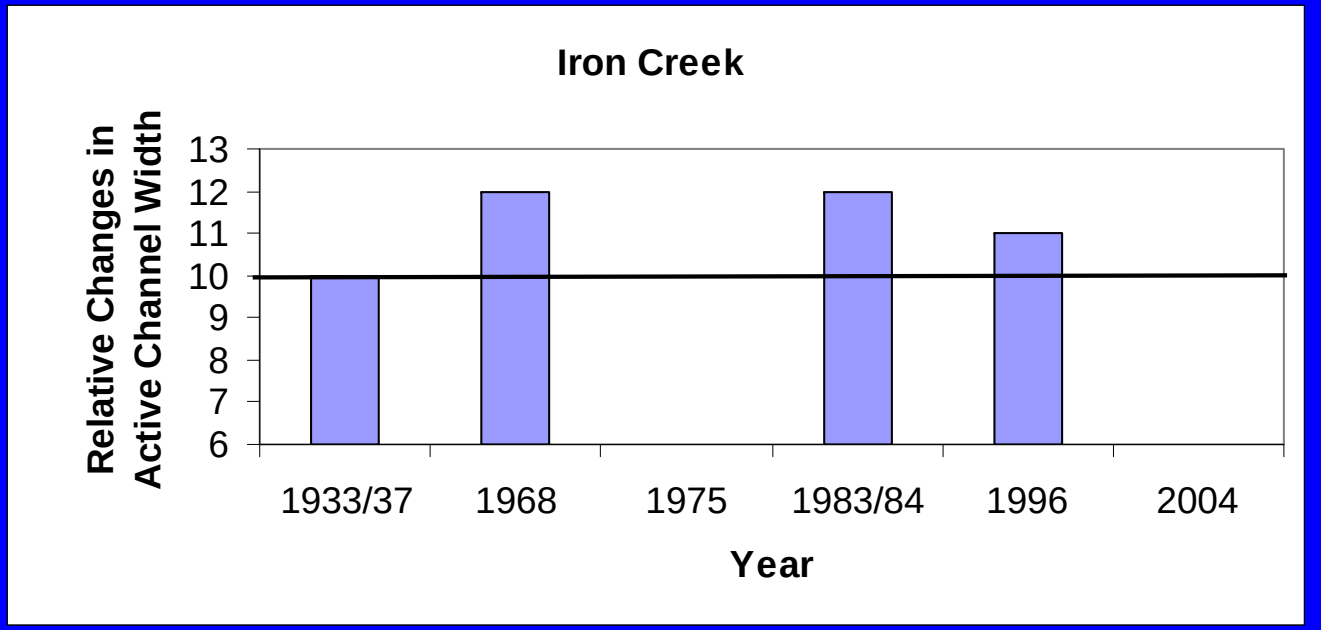
Upper Little North Fork

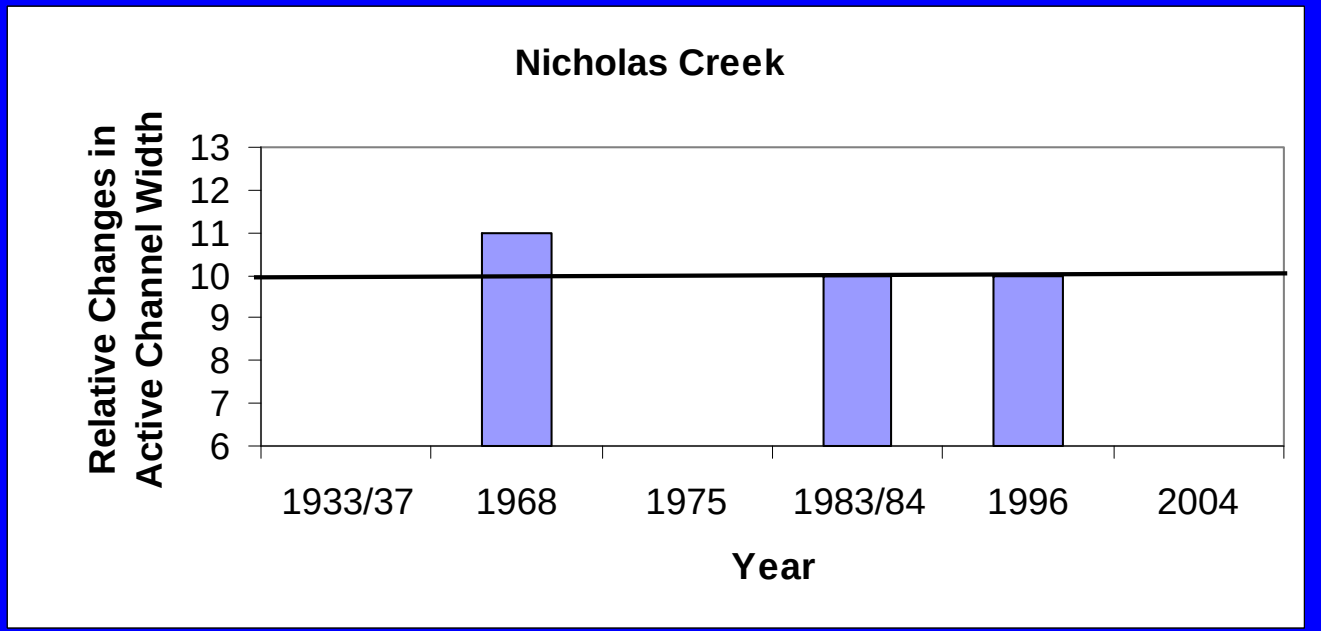
Active Channel Width



Active Channel Width:

Tributaries





Current Channel Erosion

- **Mostly stable banks**
- **Tributary channel bank erosion is no longer a major sediment source**
- **Some evolution stage 5 (or 4) channels have unstable banks; in some cases caused by road encroachment**
- **Mainstem bank erosion occurs at bends and LWD jams, but is not a net source of coarse sediment -- an equal amount deposits as gravel bars**

Tributary entrenchment

- Many channels downcut in past, now stable
- Steeper channels have floodplains and grade control (LWD, boulders)
- Downcutting not a current sediment source
- Floodplains on tributaries reduce erosive energy

A few tributaries are still unstable

- **found primarily in Iron sub-basin; also Canyon Fork above Nicholas**
- **tight confinement by streamside roads (Iron above Rablens; East Fork Hudlow?)**
- **ATVs in channel (fine and coarse sediment)**
- **old logging roads directly up creeks (Cataract, W. Fork Moose)**

Iron Creek near mouth: fine sediment from ATV erosion

Current sediment load

- Mainstem active channel has alternating reaches of moderate and low coarse sediment load
- Sediment storage by LWD is common in tributaries and on mainstem above Tom Lavin Creek, intermittent in middle reaches, rare below Iron Creek (channel width effect)
- Low to moderate coarse sediment load on most tributaries
- High fine sediment load in lower Iron Creek (ATV erosion)

Estimated channel erosion rates

60% coarse sediment, 40% fine

Current erosion

- **Primarily banks**
- **1,400 t/yr**
- **33 t/sq mi/yr (background rate is 14.7)**

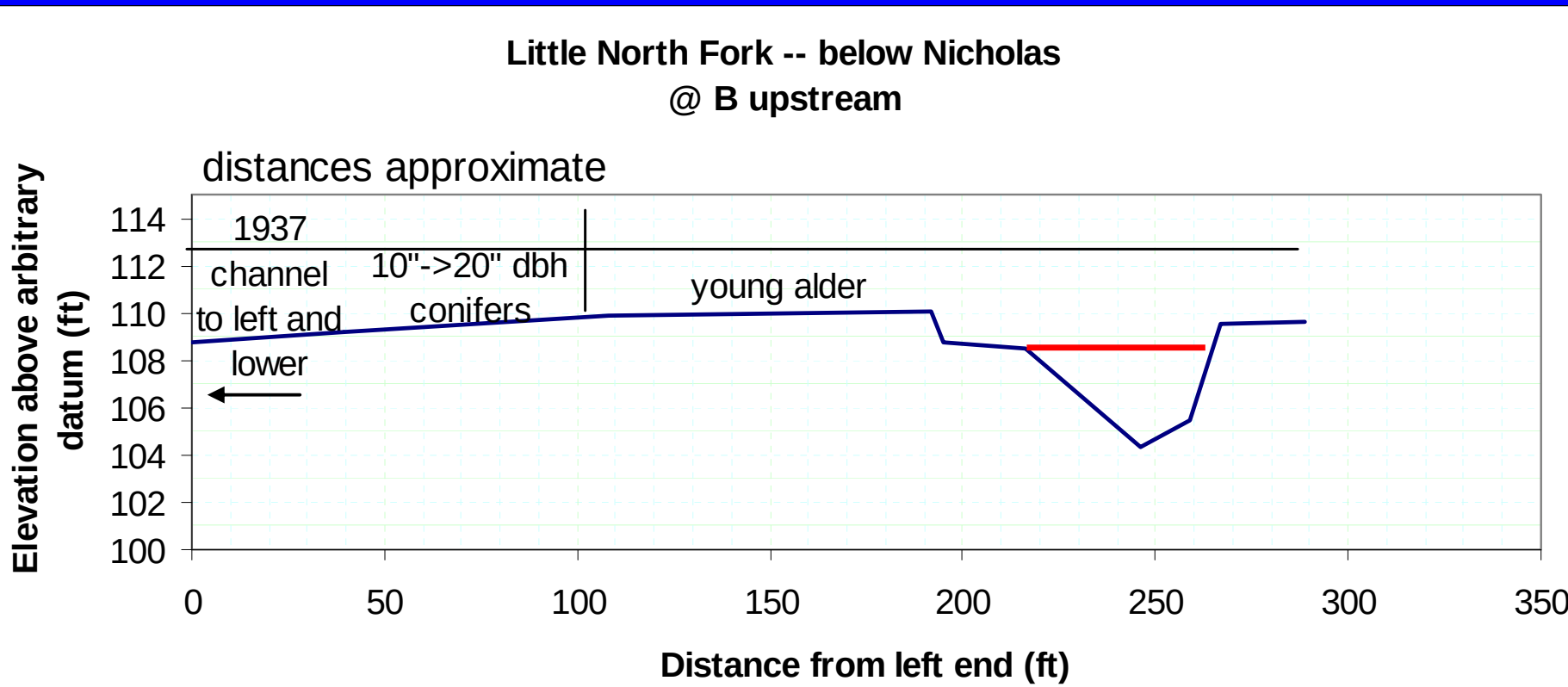
Old channel erosion

- **Entrenchment of streambed and banks**
- **260,000 CY**
- **14,000 t/yr if it took 30 years**
- **330 t/sq mi/yr**

Recovery of Little North Fork CDA River channel from high coarse sediment load

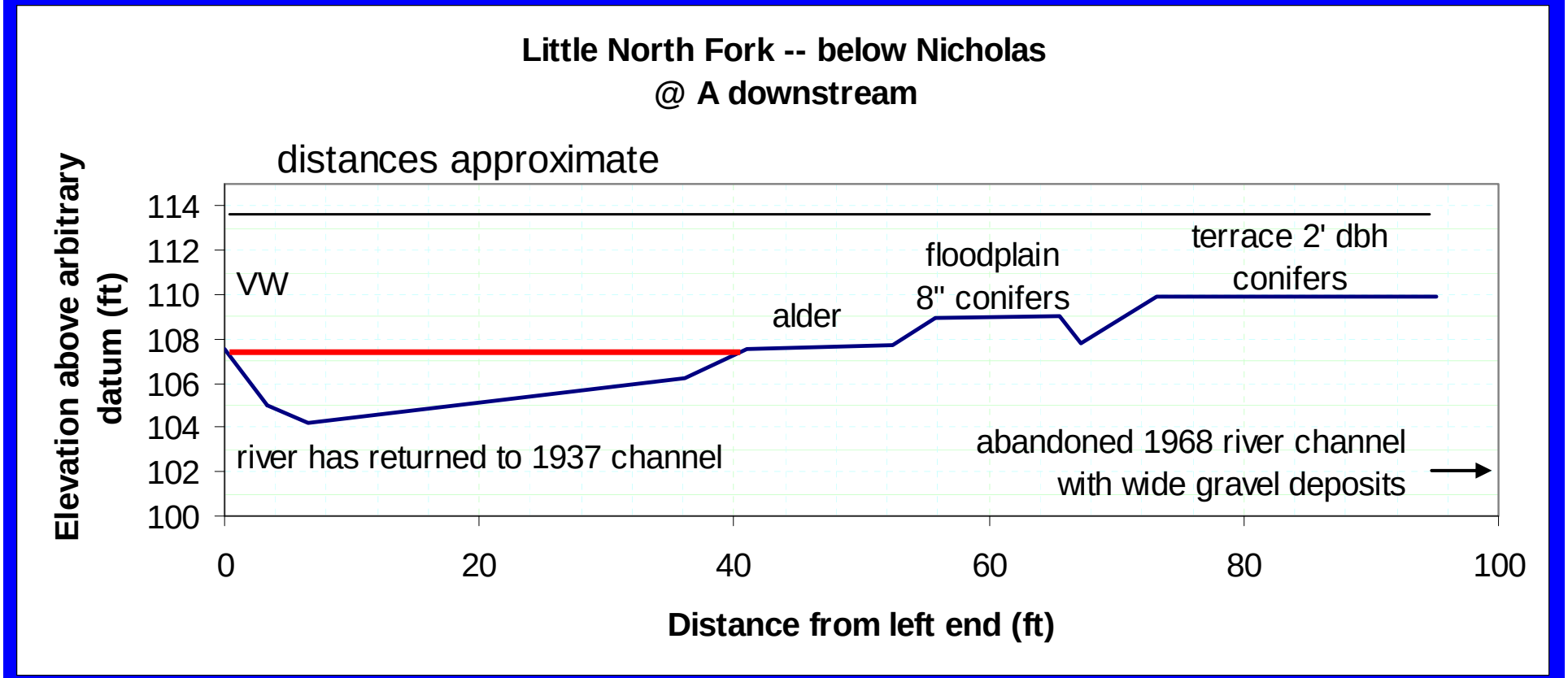
- **SIgnificant recovery of channel width by 1996 in air photos**
  - **only 1/3 of maximum response length is still widened; reduced width throughout**
- **Partial recovery of river channel in cross-section**
  - **some minor downcutting in 60% of sites**
  - **40% of sites are still perched or unentrenched**
- **Large volumes of coarse sediment are stored in floodplains of response reaches – out of circulation**

Below Nicholas, upstream: river is still perched in gravel deposits from 1960s-80



Perched channel is 70% bars

Below Nicholas, downstream: river has jumped back to 1937 channel, leaving wide gravel deposits behind on floodplain



Low, 1937 channel has 5% of area in bars

Sediment storage by LWD is common on mainstem above Tom Lavin Creek (channel width effect)

Sediment storage by LWD is intermittent in middle reaches: example near Lewellyn Creek

Sediment storage by LWD is rare below Iron Creek (channel width effect)

Preliminary Recommendations for upper Little North Fork

- **Preventive sediment reduction measures (roads)**
- **Target tributary streams with high delivery potential to mainstem**
- **Treat the short list of active sediment sources**
- **Add LWD to reduce downstream export of coarse sediment (increase floodplain sediment storage)**
  - **Target meadow reaches or those with low amounts of functional in-stream LWD (typically zones where rapid channel migration has reset vegetation to young age)**
  - **Add functional key members with rootwads**