Lower Kaskaskia River: Carlyle Lake to the Mississippi River Confluence

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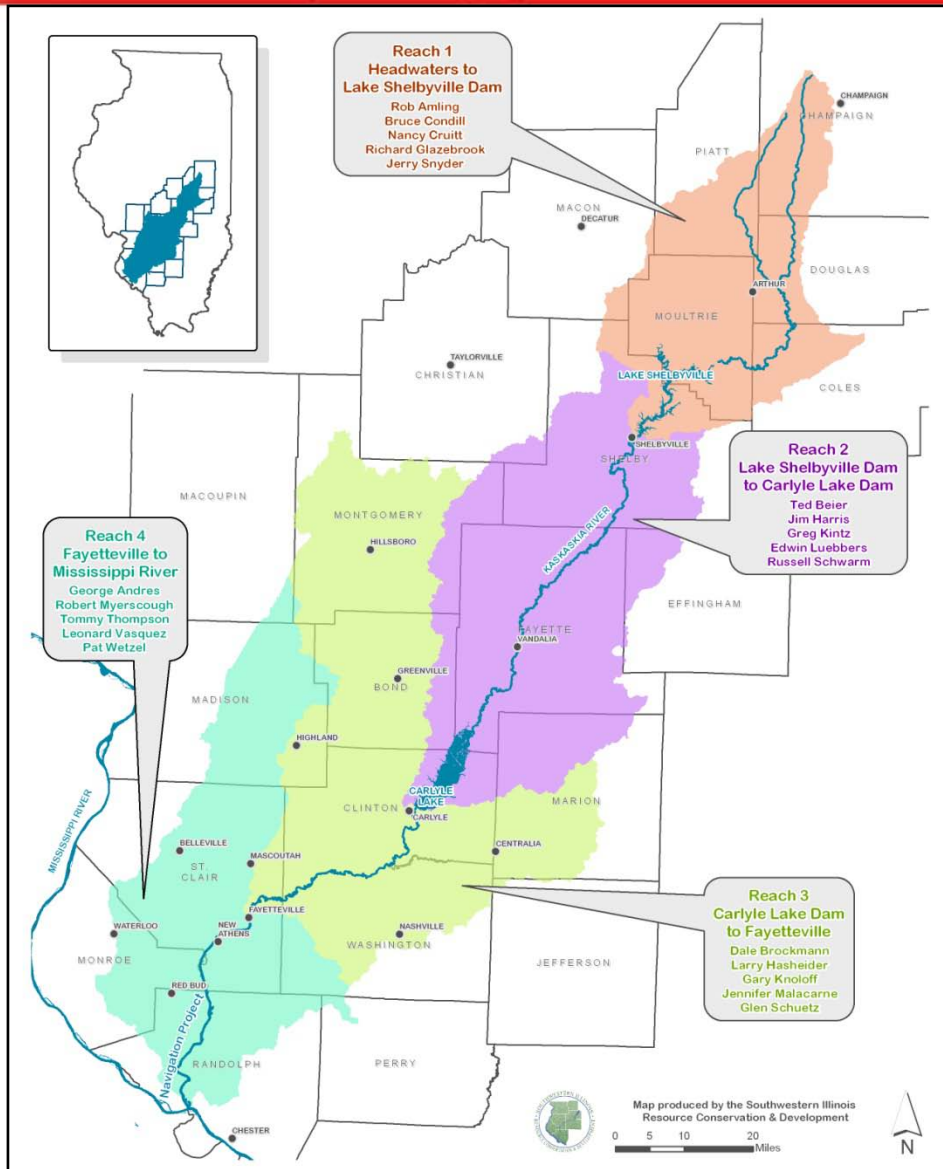
- Lower Reach Includes:
  - Reach 3 (Carlyle Dam to Fayetteville)
  - Reach 4:
    - Navigation Project
    - Lock & Dam
    - Grade Control Structure
    - Dredging



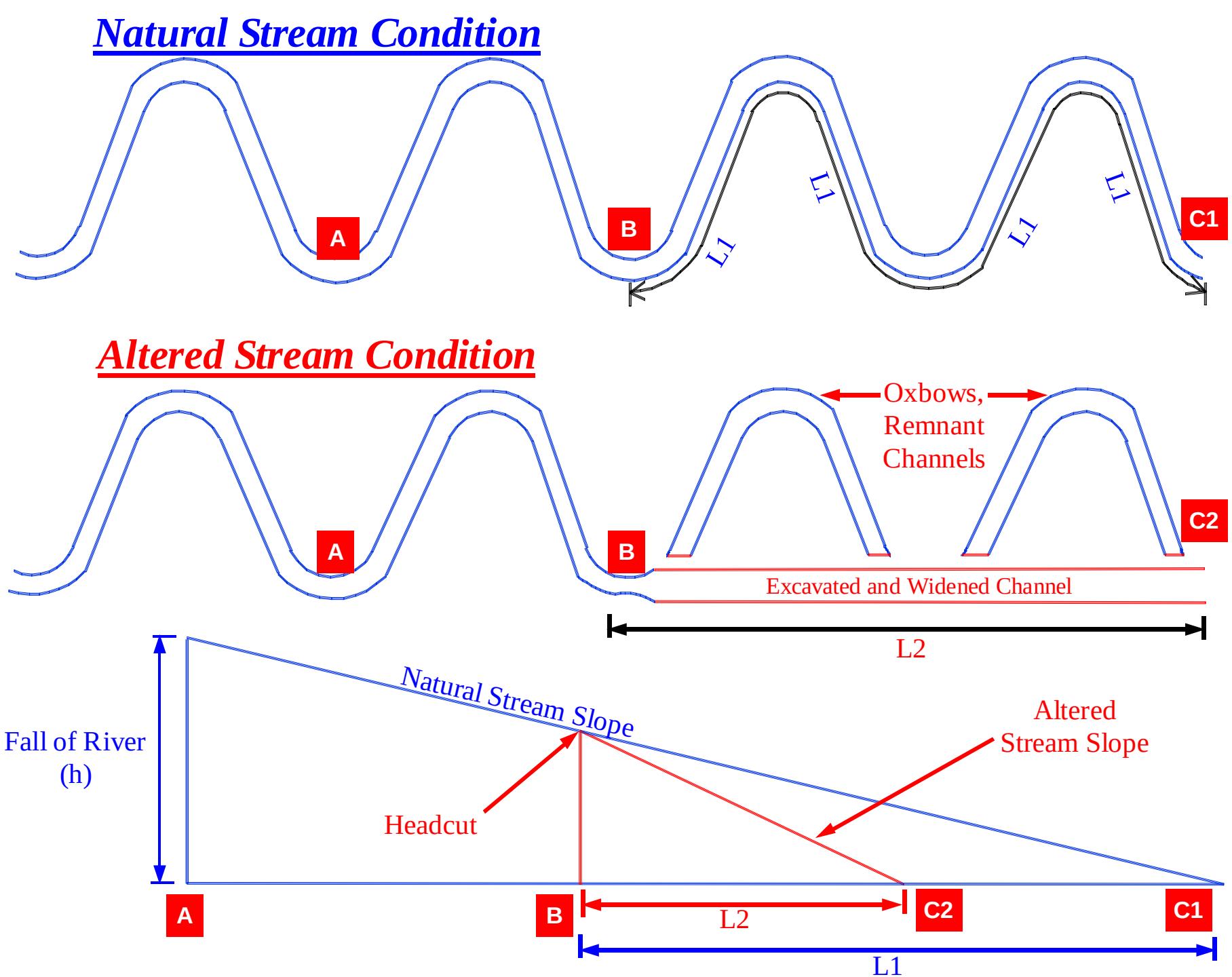
Navigation Project Timeline

1962 – Navigation Project Authorized by Congress
1972 – Excavation of Navigation Channel is Complete
1976 – Project is Completed

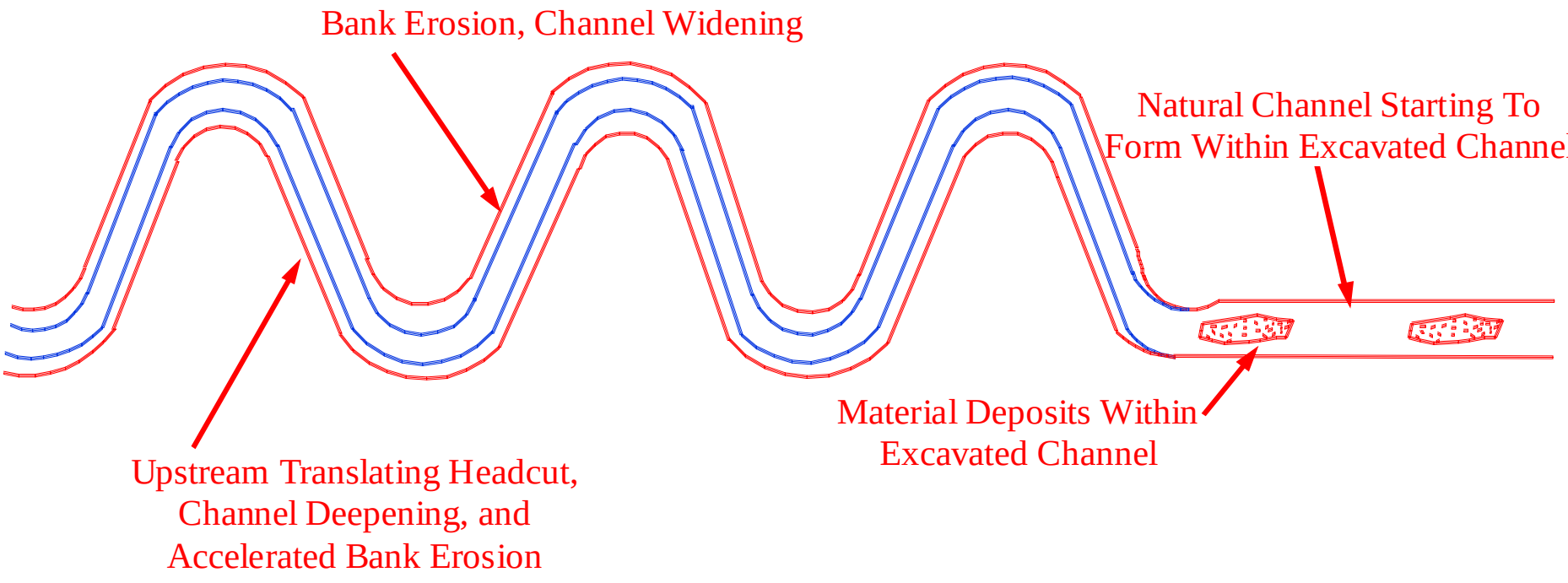
Consequences

- Channelized 36 Miles of River:
  - Reduced channel length by 16 miles
  - Increased the natural river slope by 80%
    - 0.25 ft/mile to 0.45 ft/mile
  - Widened by 80% (125 ft to 225 ft)
  - Deepened to 9 feet

- Result was an unstable river:
  - Severe headcutting and widening upstream
  - Significant Filling in the Navigation Channel


Natural Stream Condition
A
B
L1
L1
L1
C1
Altered Stream Condition
A
B
Oxbows,
Remnant
Channels
C2
Excavated and Widened Channel
L2
Fall of River
(h)
Natural Stream Slope
Altered
Stream Slope
Headcut
A
B
L2
C2
C1
L1

Results of Headcutting (if grade control is absent)



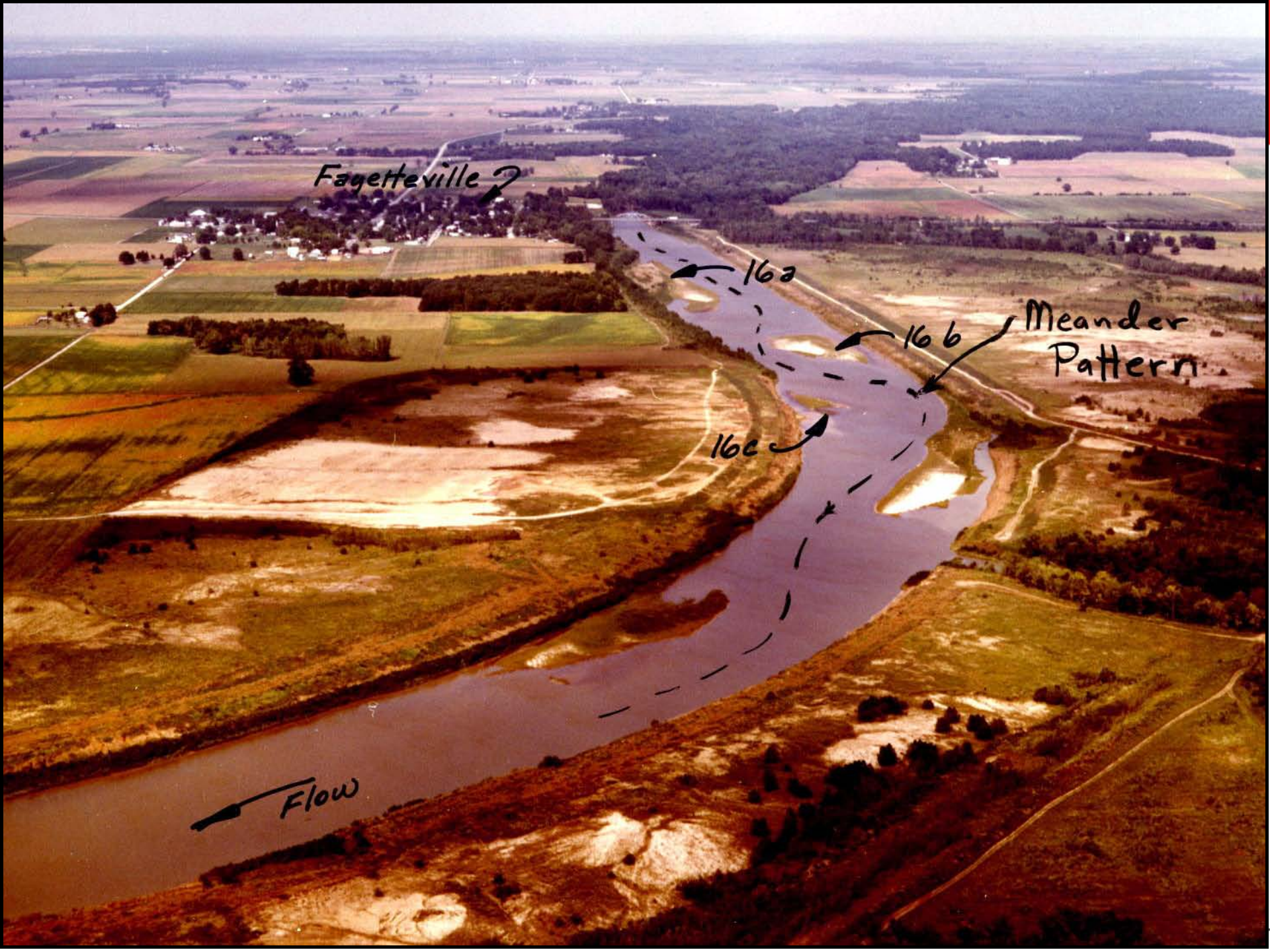

MILE 5
MILE 4
MILE 3
MILE 2
MILE 1
FAYETTEVILLE
1962


MILE 5
MILE 4
MILE 3
MILE 2
MILE 1
FAYETTEVILLE
1978


MILE 5
MILE 4
MILE 3
MILE 2
MILE 1
FAYETTEVILLE
1984

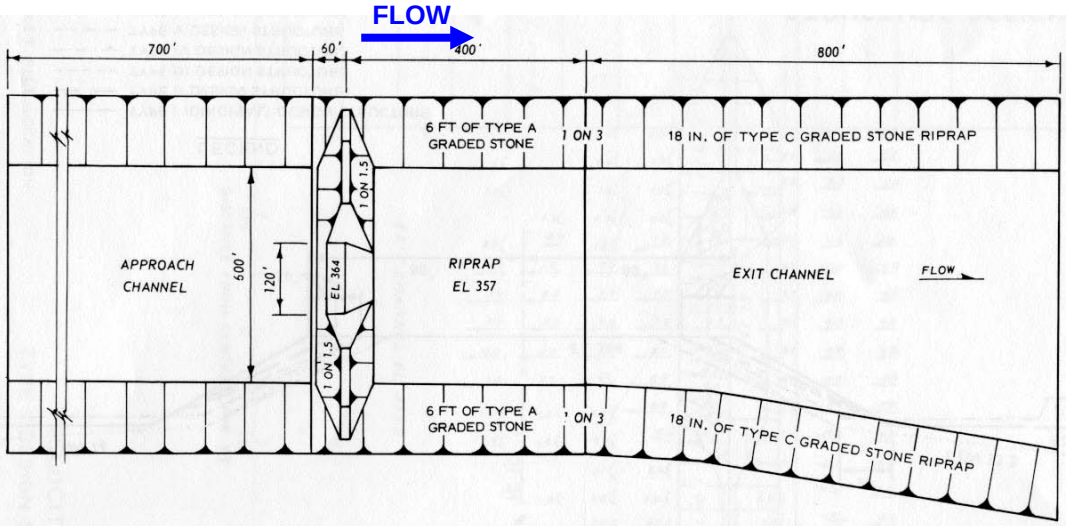

MILE 5
MILE 4
MILE 3
MILE 2
MILE 1
FAYETTEVILLE
1998


12


Fayetteville ?
16a
16b
Meander Pattern
16c
Flow

Grade Control Structure

- 1978 - the initial headcut had moved 11 miles upstream
- 1982 - Constructed a grade control structure at Fayetteville
  - Purpose – To prevent a second headcut as a result of re-dredging the navigation channel in 1983-85.



Stone Used is Type "A" = 5000 lb top size

GENERAL PLAN OF
TYPE VI (RECOMMENDED) DESIGN
GRADE-CONTROL STRUCTURE

Navigation Project Timeline (Cont.)

1983-85

- Navigation Channel is Re-dredged (over 2.5 Million Cubic Yards).
- A second headcut is not observed.

2000's – Erosion Study Efforts

- Conducted field reconnaissance by air and by boat to better define the problems.
- Assembled and analyzed all available historical photographs to determine erosion rates.
- Met with local landowners to discuss individual problems.
- Determined the river morphology (the character of the river).
- Developed possible measures for solutions.
- Incorporated solutions with both engineering and environmental considerations.
- Prepared cost estimates for recommendations
- Prepared and published Reports, presented results.

Headcutting up tributaries too

1988 – Original Headcut is about 21 miles above Fayetteville.

1999 – Headcut is 30 miles above Fayetteville. New Floodplain Established approx 2 mile upstream of Grade Control.

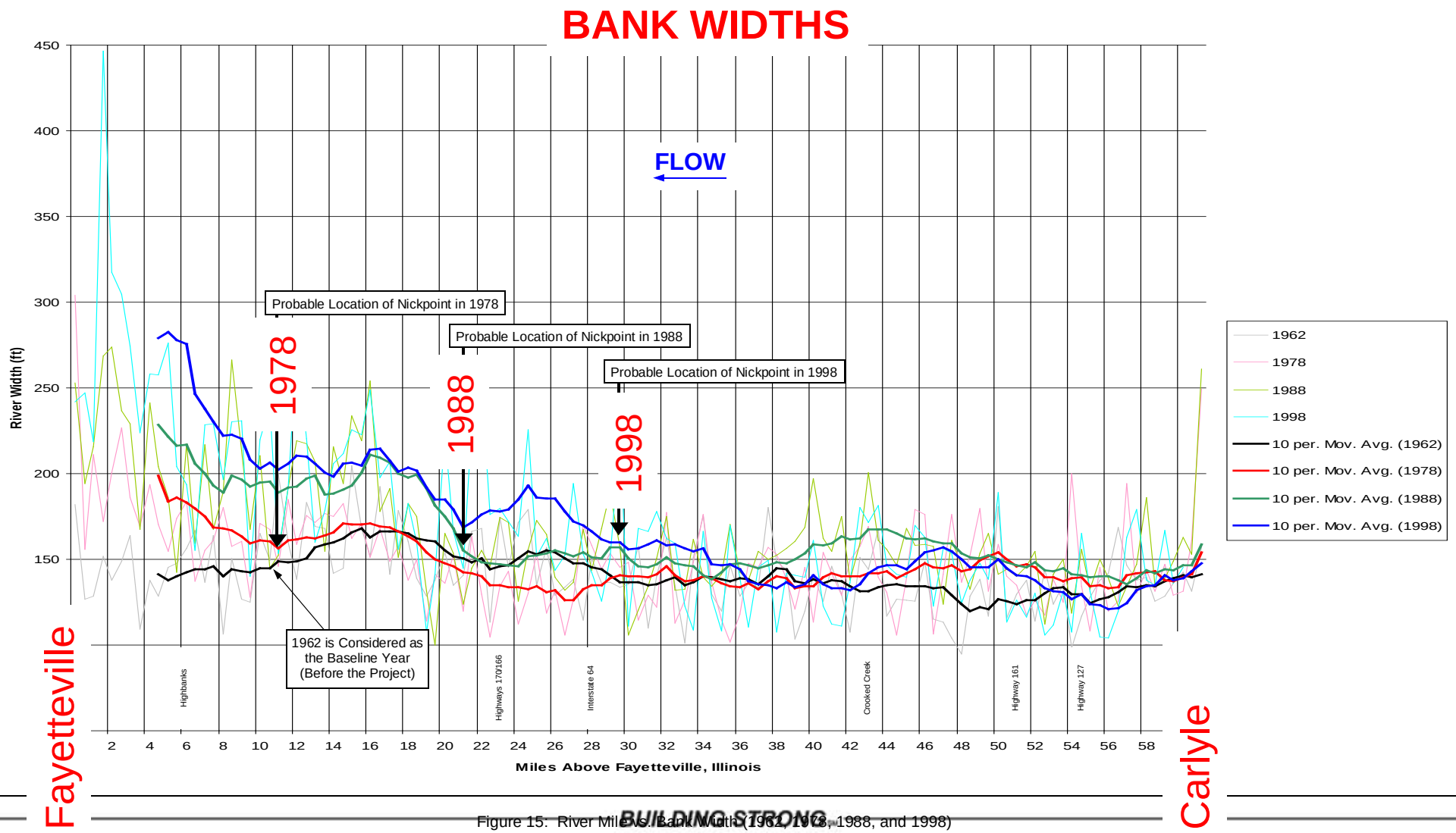
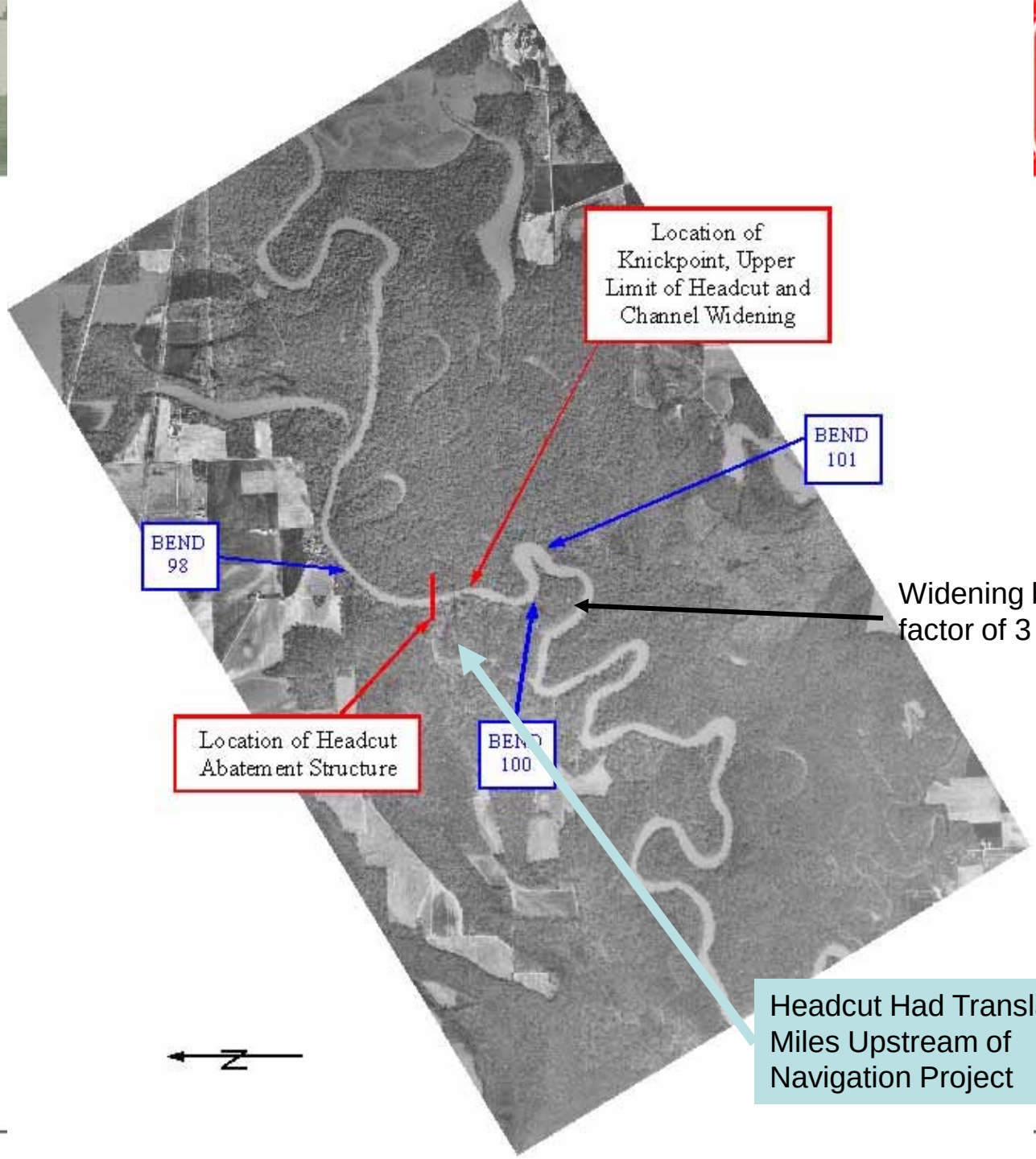


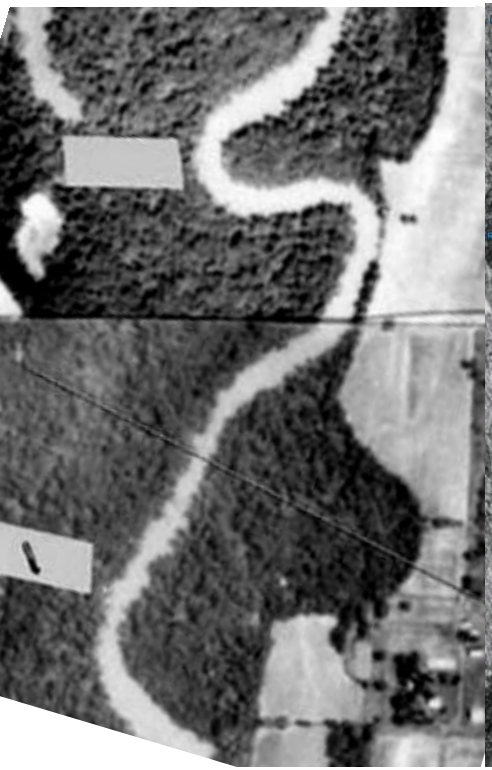
Figure 15: River Miles vs. Bank Width (1962, 1978, 1988, and 1998)


Location of Knickpoint, Upper Limit of Headcut and Channel Widening
BEND 101
BEND 98
Widening by a factor of 3
Location of Headcut Abatement Structure
BEND 100
N
Headcut Had Translated 30 Miles Upstream of Navigation Project

Headcutting

- Widening rates have been as high as 5 feet per year.
- Some natural healing is evident near Fayetteville.
- Areas upstream of headcut are unaffected.

1962 1988 1998 2011



THE GOOD

THE BAD

Navigation Project Timeline

2000 (Feb) – Technical Report M13: Identified headcutting as the major cause of bank erosion.

2000 (Mar) – USACE determines that it has no authority to make repairs outside of the Kaskaskia River Project Limits.

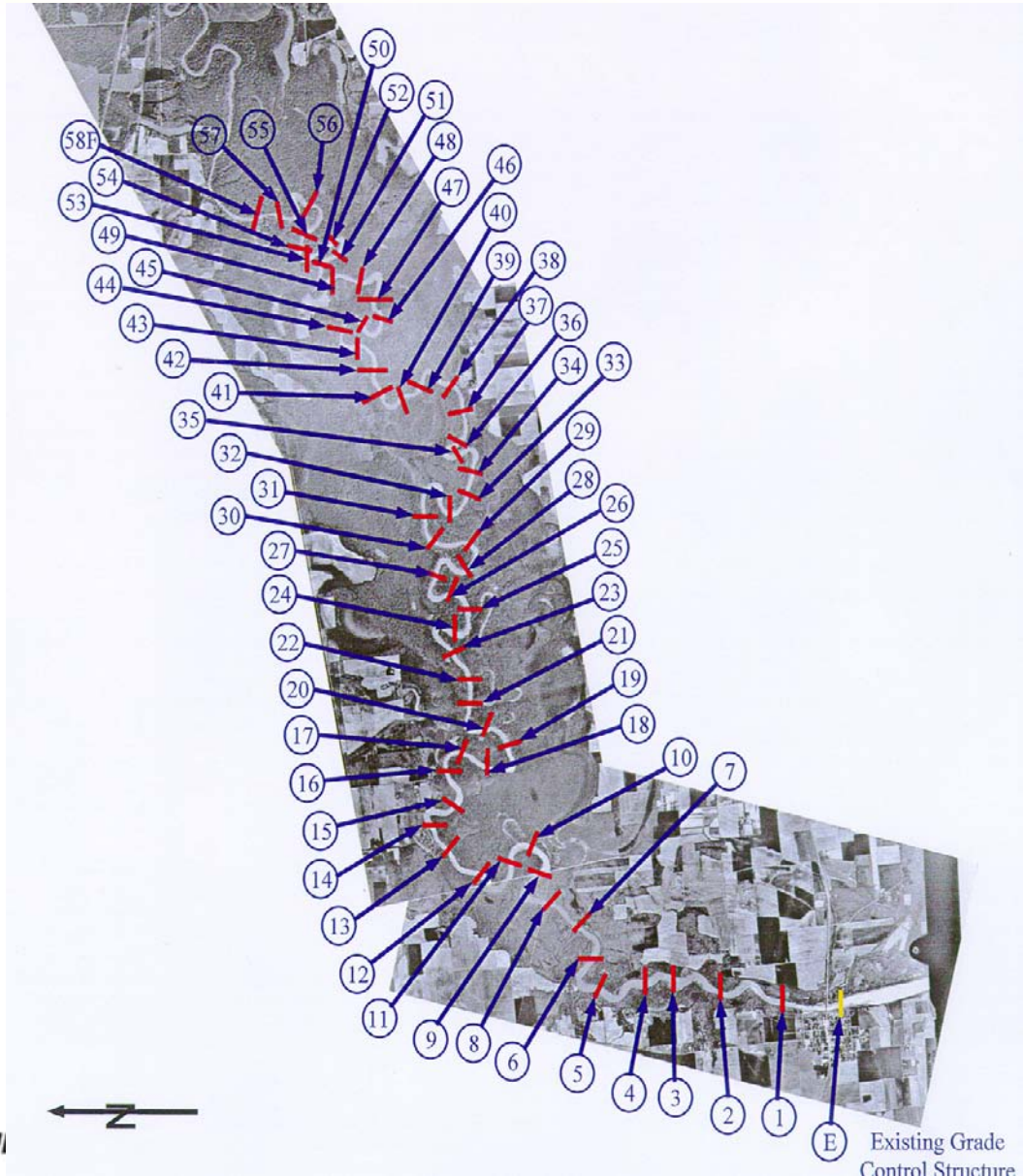
2003 – Technical Report M27 – Further identifies the problem in an effort to obtain authority for repairs.

Report Conclusions

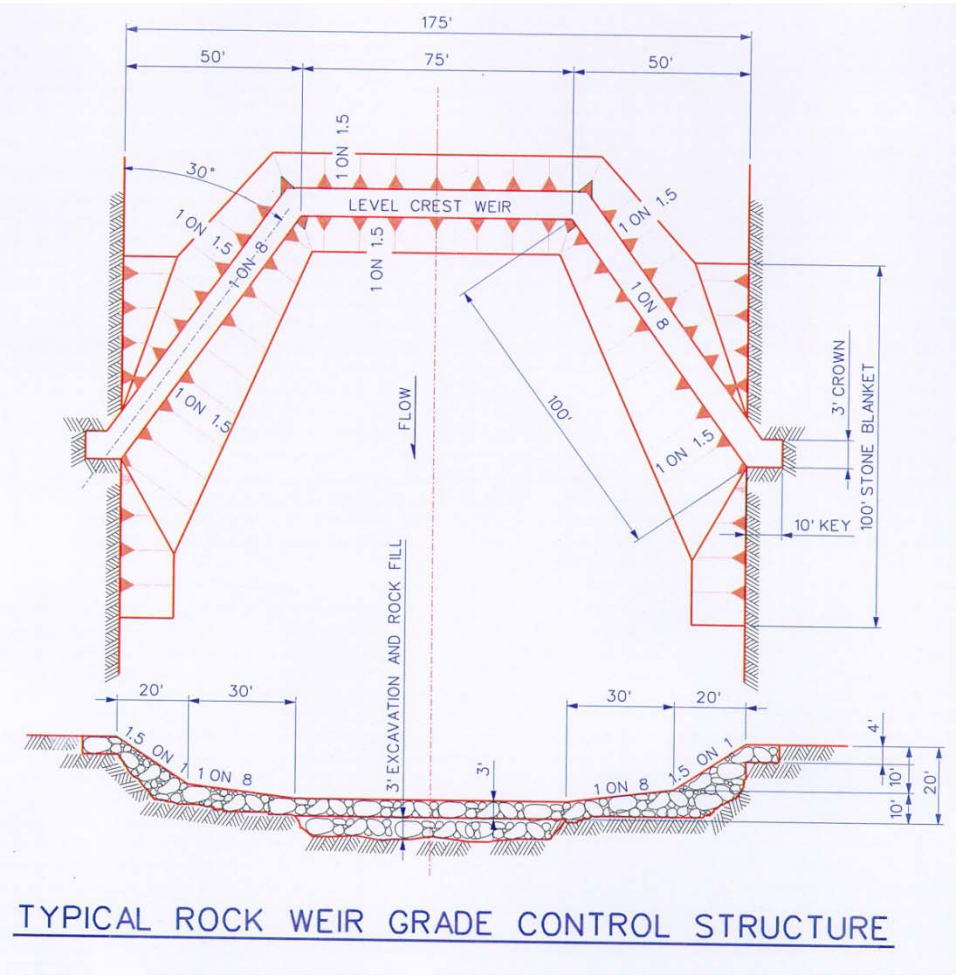
- Releases from Carlyle Lake have not increased bank erosion rates.
  - Bank erosion in the upper reaches is insignificant.
- Headcutting remains as the #1 cause of bank erosion.
  - The river morphology has been permanently altered.
  - The headcut may continue to migrate upstream if it is not stopped.
  - Bank erosion and widening will continue.
  - Infrastructure and private property will be threatened and damaged.
  - Undocumented headcutting and bank erosion will continue on tributaries.
  - Additional sediment will continue to be deposited in the navigation channel

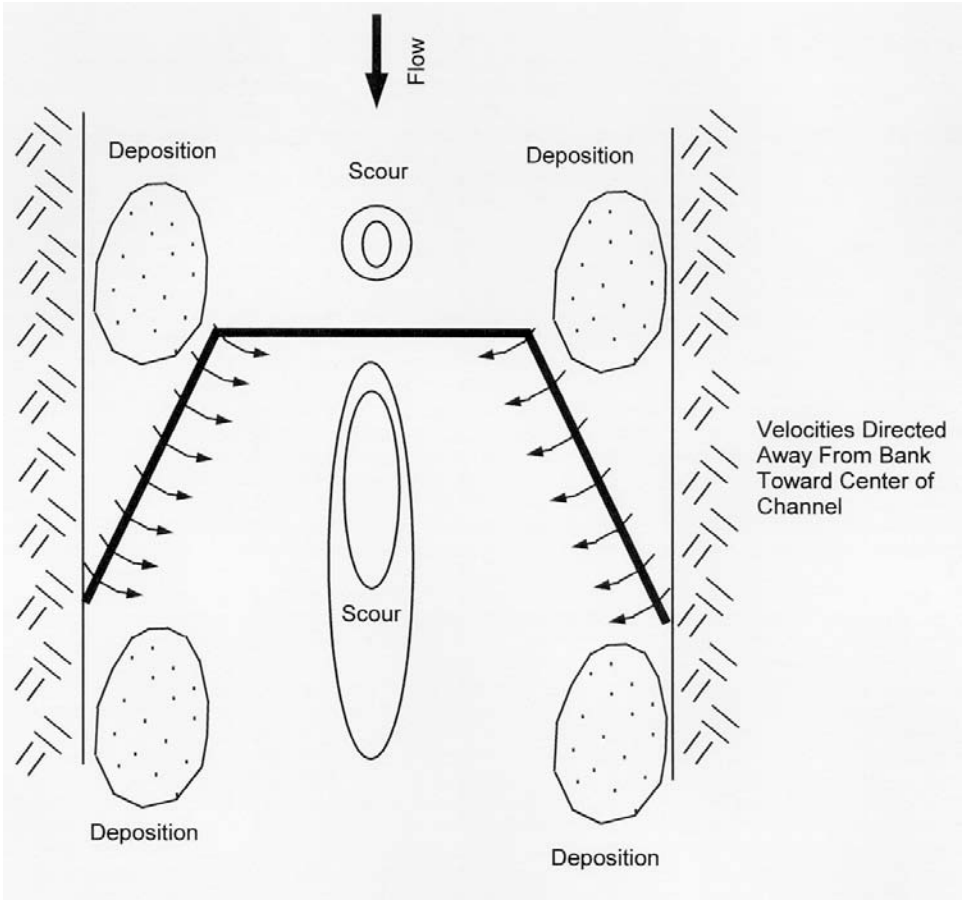
Proposals

1. Do Nothing
2. One Headcut Abatement Structure
3. Add one Headcut Abatement Structure on Each Tributary
4. Add 50+ intermediate grade control
5. Add intermediate grade control on tributaries



Typical Designs





Navigation Project Timeline

2007 – Water Resources Development Act (WRDA), Section 5073

- Authorizes the development of “a comprehensive plan for the purpose of restoring, preserving, and protecting the Kaskaskia River Basin.”

- The plan shall include, “the study and design of necessary measures to reduce ongoing headcutting and restore the aquatic environment of the Basin that has been degraded by the headcutting that has occurred above the existing grade control structure.”

- Appropriations have not been received.

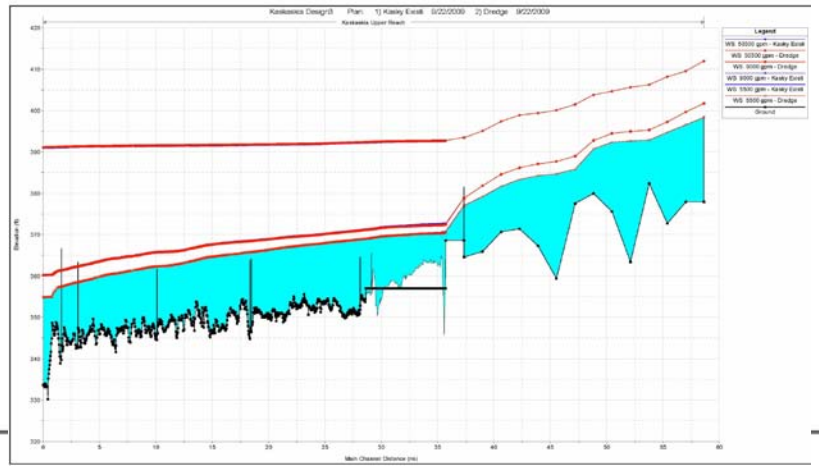
Navigation Project Timeline

2008 (Dec) – Administration requests potential stimulus projects

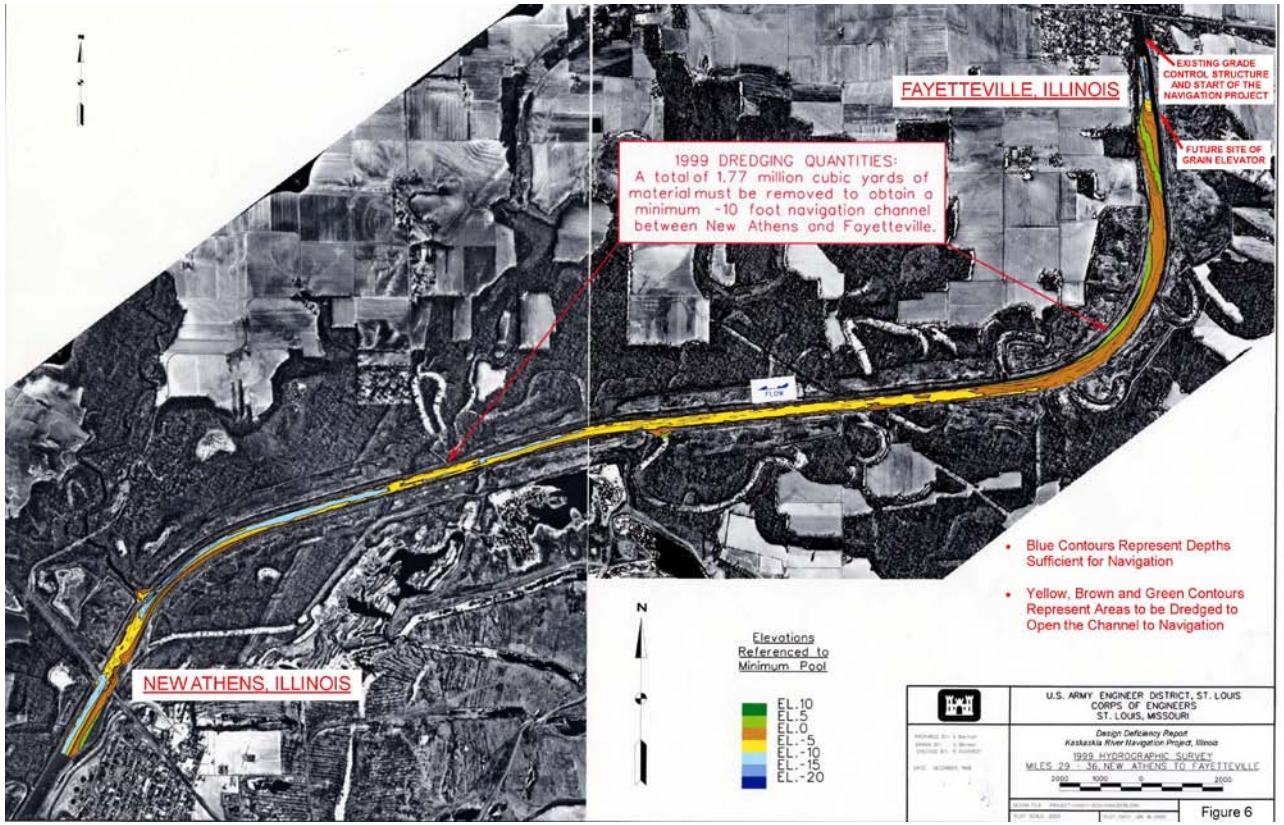
- Must be “Shovel Ready”
- New Starts / Studies are not included

2009 (May) – ARRA (Stimulus) Funding is received to re-dredge the navigation channel New Athens to Fayetteville.

2009 (Sep) – Hydraulic model study verifies that the grade control structure is sufficient and additional headcutting will not occur as a result of dredging.



Dredging of 8 Miles: New Athens to Fayetteville



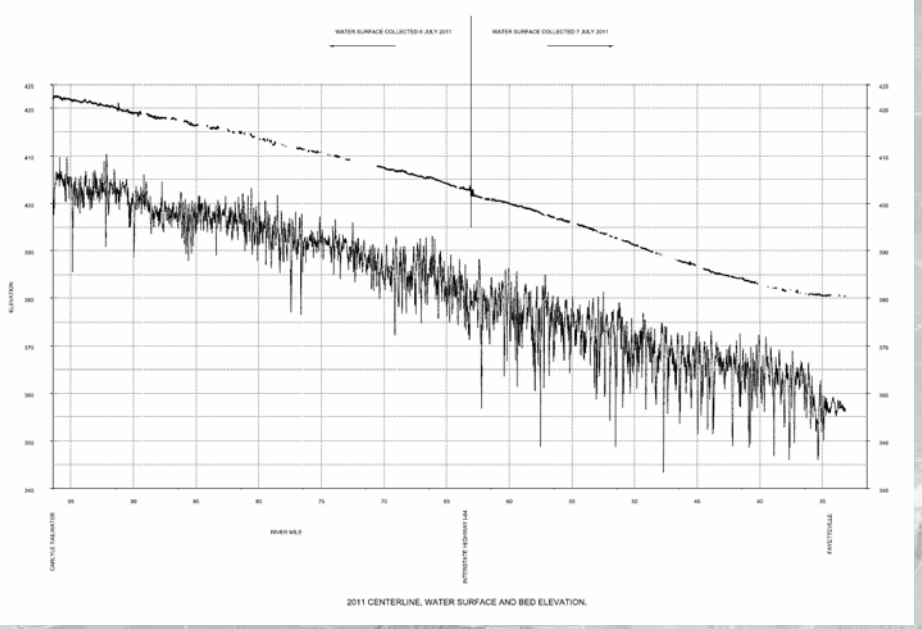
- 2 Million Cubic Yards Estimated
  - Dredge 11 feet below minimum pool (368 feet) or 357 feet
  - 130-ft bottom width
  - At Mile 36: 450-ft wide turnaround area
  - Dredge some bends up to 300-ft wide
- Disposed in upland disposal containment areas.
  - Overflow weirs, geotextile tubes, and other erosion control measures used to remove sediment from the water.

2010-11 Dredging Project

- 2010 – 1.7 Million Cubic Yards Removed
- Spring 2011 – 250,000 Cubic Yards Re-Dredged
- August 2011 – 130,000 Cubic Yards Re-deposited
- Monitoring continues both upstream and downstream of Fayetteville

Monitoring

- Collect surveys upstream of Fayetteville.
- Compare data to previous years. Evaluate for abnormal channel widening and/or degradation.
- Public input and awareness.
- Sediment input into newly dredged navigation channel.
- Monitor the condition of the Grade Control Structure.



2011 CENTERLINE, WATER SURFACE AND BED ELEVATION.

2009 SURVEY LINE 1 PLAN

2009 SURVEY LINE 1 PROFILE

2011 SURVEY

2009 SURVEY LINE 1 PROFILE

Maintenance

- Sediment input into newly dredged navigation channel.
- Original Estimate was 50,000 to 75,000 cubic yards annually
- 1988 Study estimated 250,000 cubic yards annually
- Based on Past History: 85,000 cubic yards per year (2 million yards since 1985)

(Headcutting and variable flow rates make it impossible to predict sediment deposition rates)

Questions?