



Arizona Riparian Council

3/12/04



Vegetation Studies along the Lower Verde River

The logo for ERO Resources Corp. features the letters "ERO" in a bold, serif font. The letter "O" is stylized with a circular arrow around it, suggesting a cycle or a process.

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1842 Clarkson Street
Denver, CO 80218

Lower Verde Studies

- Purpose: to evaluate the effect of Horseshoe and Bartlett on tall woody riparian vegetation along the lower Verde River (habitat for bald eagles, flycatchers, and cuckoos)
 - Riparian vegetation (ERO Resources)
 - Fluvial geomorphology (Mussetter Engineering)

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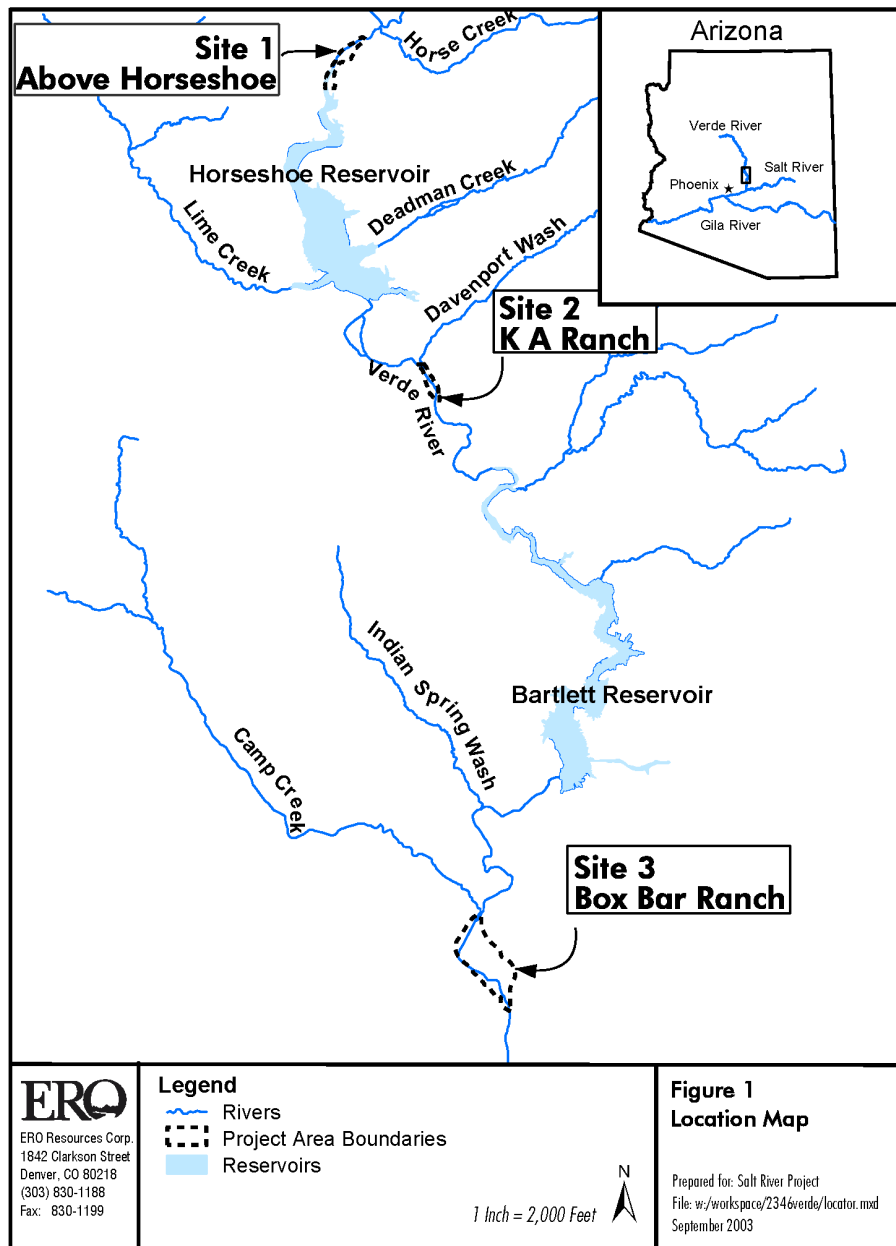
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Site Selection Criteria

- Above and below dams
- Favorable for cottonwood and willow
- With similar geomorphic characteristics if possible
- Suitable for hydraulic modeling



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Riparian Vegetation Study

- Conducted a detailed literature review
- Collected historical photos (1934-1997)
- Mapped 2002 vegetation types
- Mapped vegetation types and river channels on historical aerial photos
- Evaluated historical changes and trends in relation to geomorphic analysis

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Literature Review

- Cottonwood and willow stands result from episodic spring floods
- Flood return interval typically 1 in 7 years or longer, long recession curve
- High seedling mortality from disturbances such as scouring, drought, grazing, and trampling
- Dams have positive or negative effect, depending on the situation

Aerial Photography

Construction on Bartlett Reservoir was complete in 1936, Horseshoe in 1944

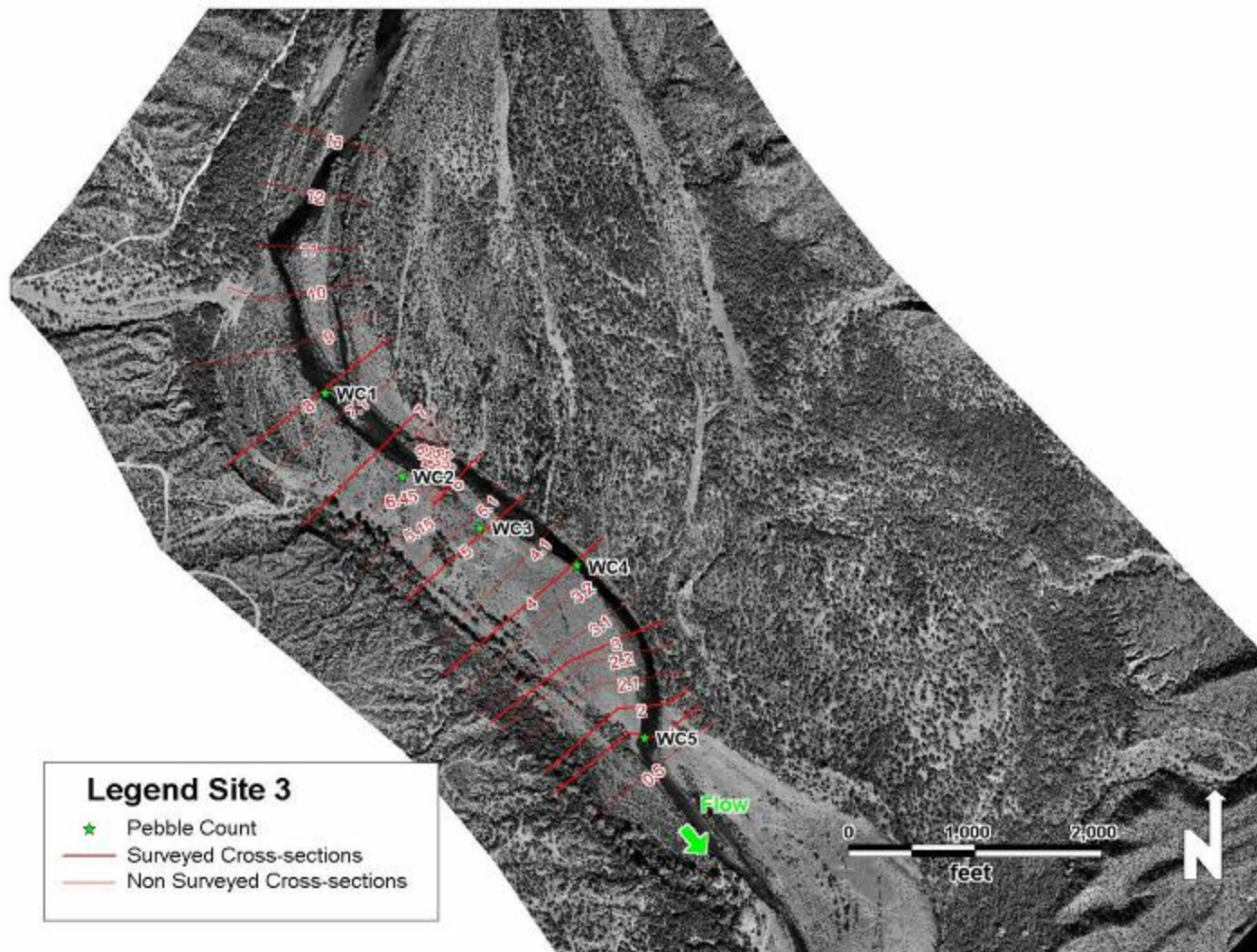
Year	Above Horseshoe	KA Ranch	Box Bar Ranch
1934	X	X	X
1953	X		X
1967		X	X
1968	X		
1976		X	X
1980	X	X	X
1988	X		X
1992	X		X
1997	X	X	X
2002	X	X	X

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Vegetation Types

- Tall Woody Vegetation Types
 - Cottonwood
 - Mixed riparian > 15 feet
 - Mixed riparian > 15 feet, low density
 - Mixed riparian < 15 feet
 - Mixed riparian < 15 feet, low density
- Other Vegetation Types
 - Mesquite
 - Strand
 - Shrub
 - Tamarisk
 - Sparsely vegetated
 - Tamarisk < 15 feet

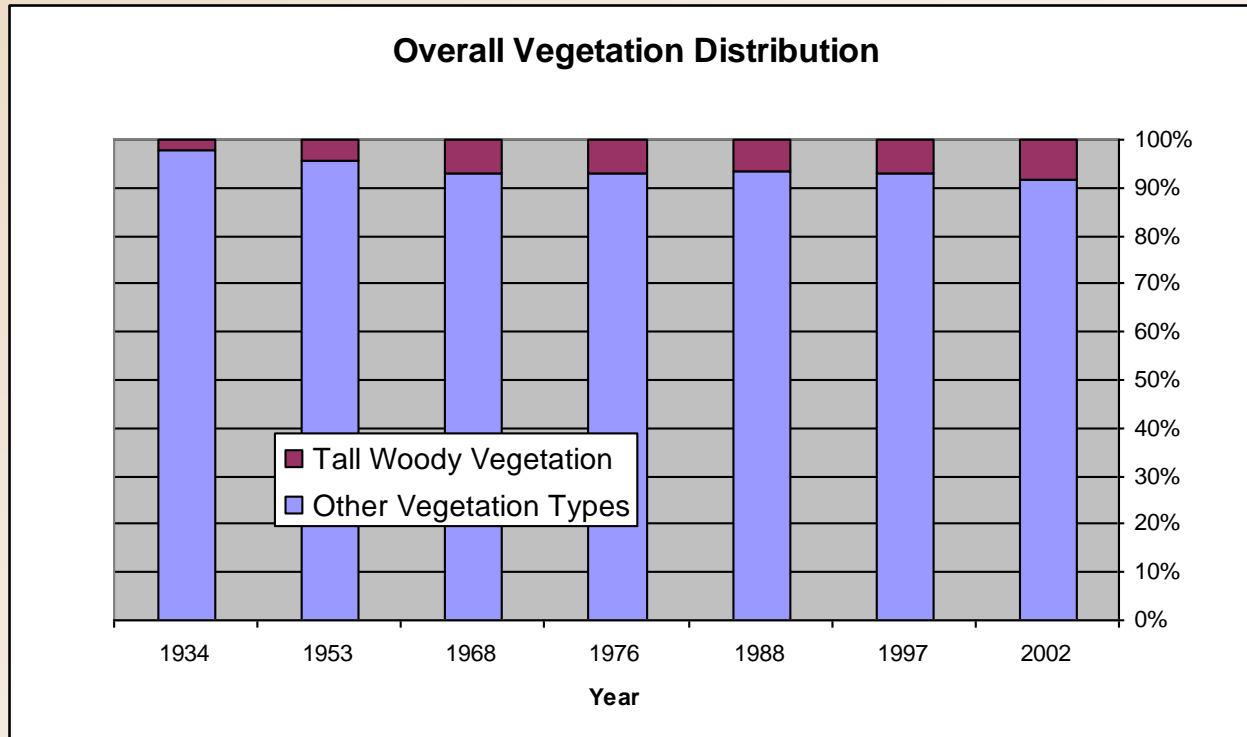
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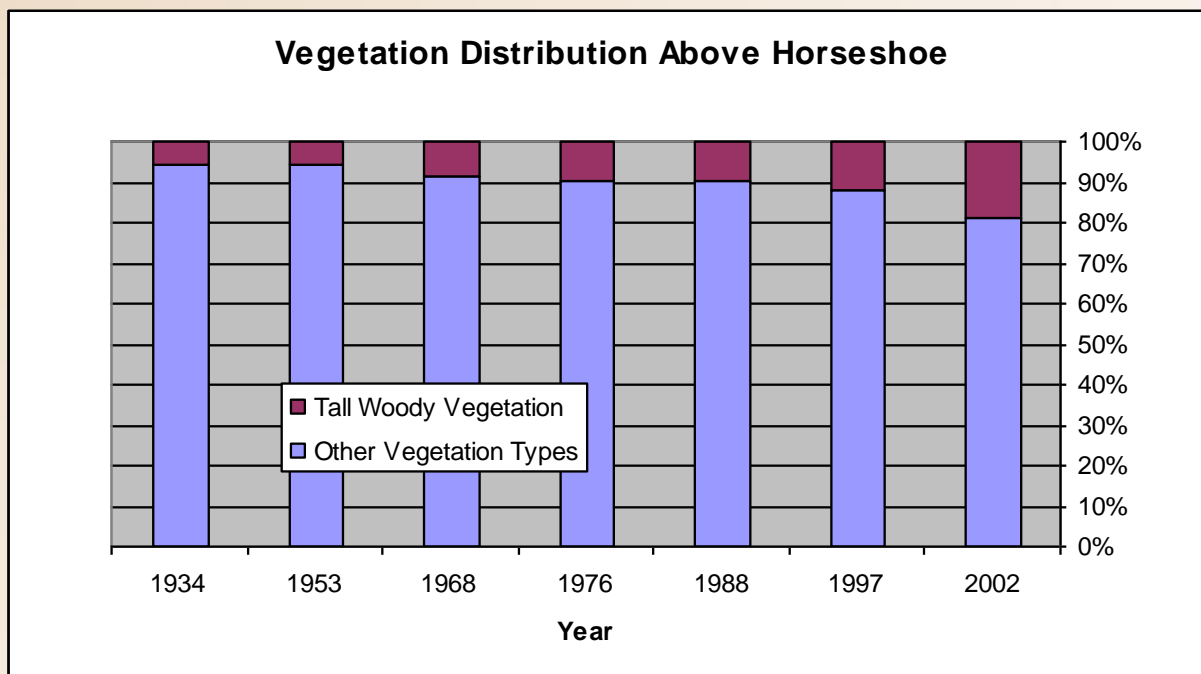


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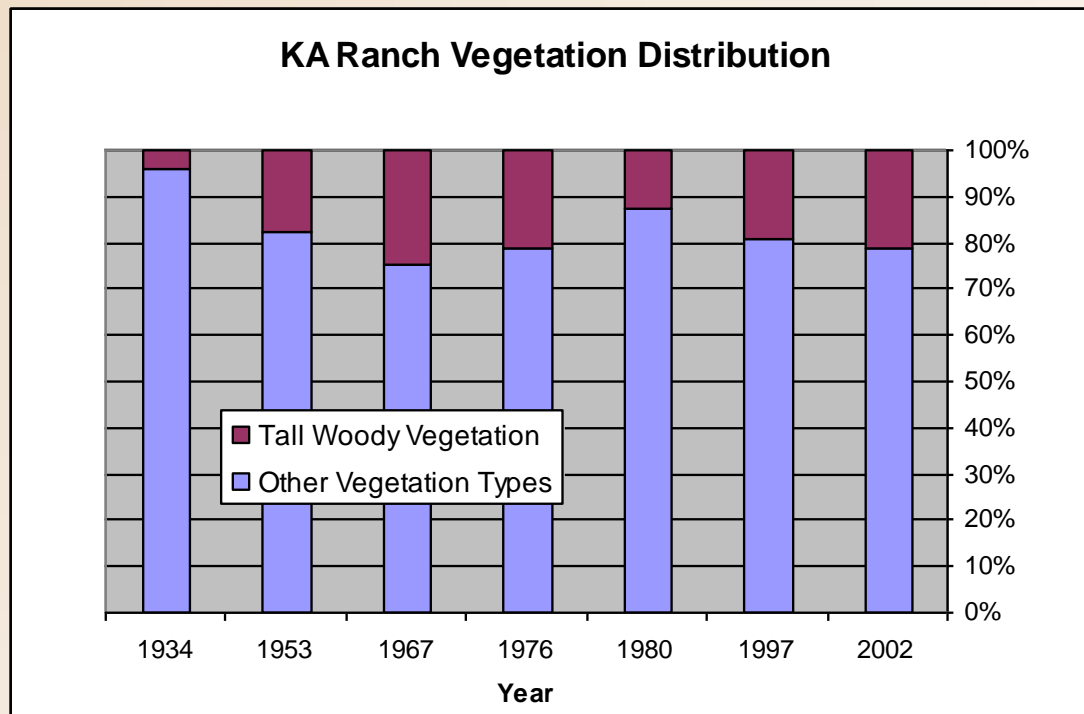
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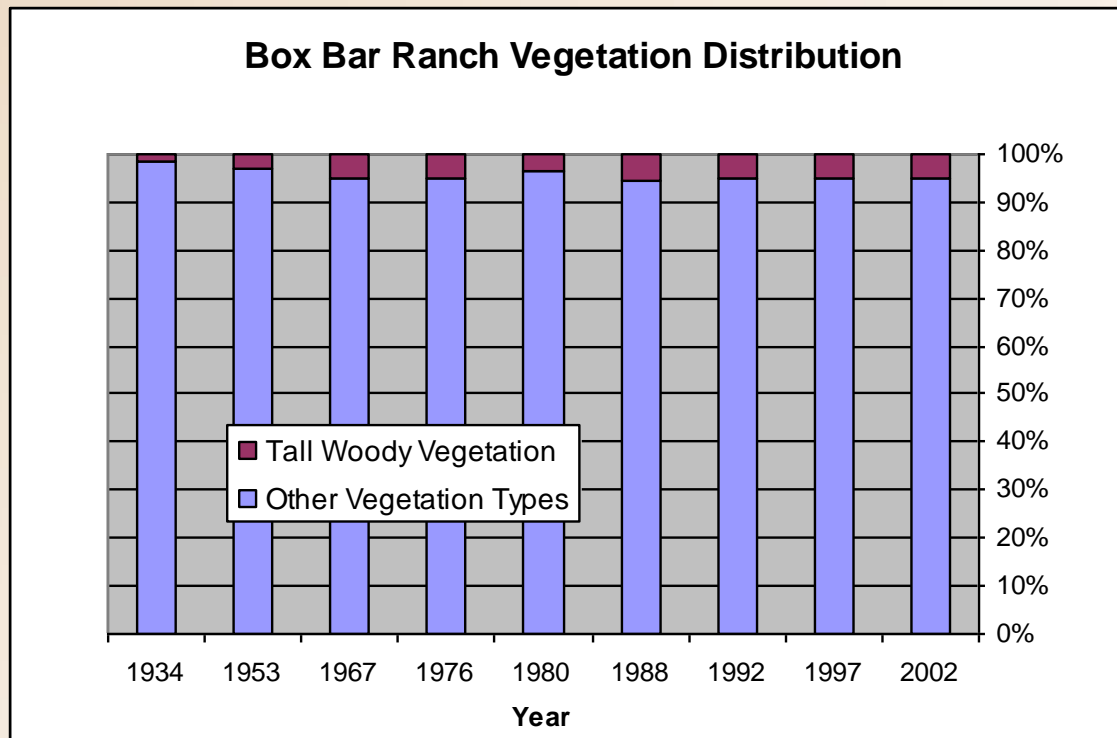
- Vegetation composition has remained fairly constant for the three sites, with a slight increase in tall woody vegetation



- Tall woody vegetation increased from 6% in 1934 to 19% in 2002




- Tall Woody Vegetation increased from 4% in 1934 to 21% in 2002
 - Site apparently is strongly influenced by sediment contributions from Davenport Wash



- Tall woody vegetation cover increased from 1% in 1934 to 5% in 2002.
 - This site characteristically has less tall woody vegetation than the site above Horseshoe Reservoir or the KA Ranch site



Conclusions of Riparian Vegetation Study

- Tall woody vegetation has increased at all sites since 1934, greater increase below dams
 - Observations and ASU studies indicate a range of age classes are present
 - Dams may provide a slight benefit to downstream tall woody vegetation by reducing scouring, and by providing 100 cfs minimum flow from Bartlett since 1994
- 



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