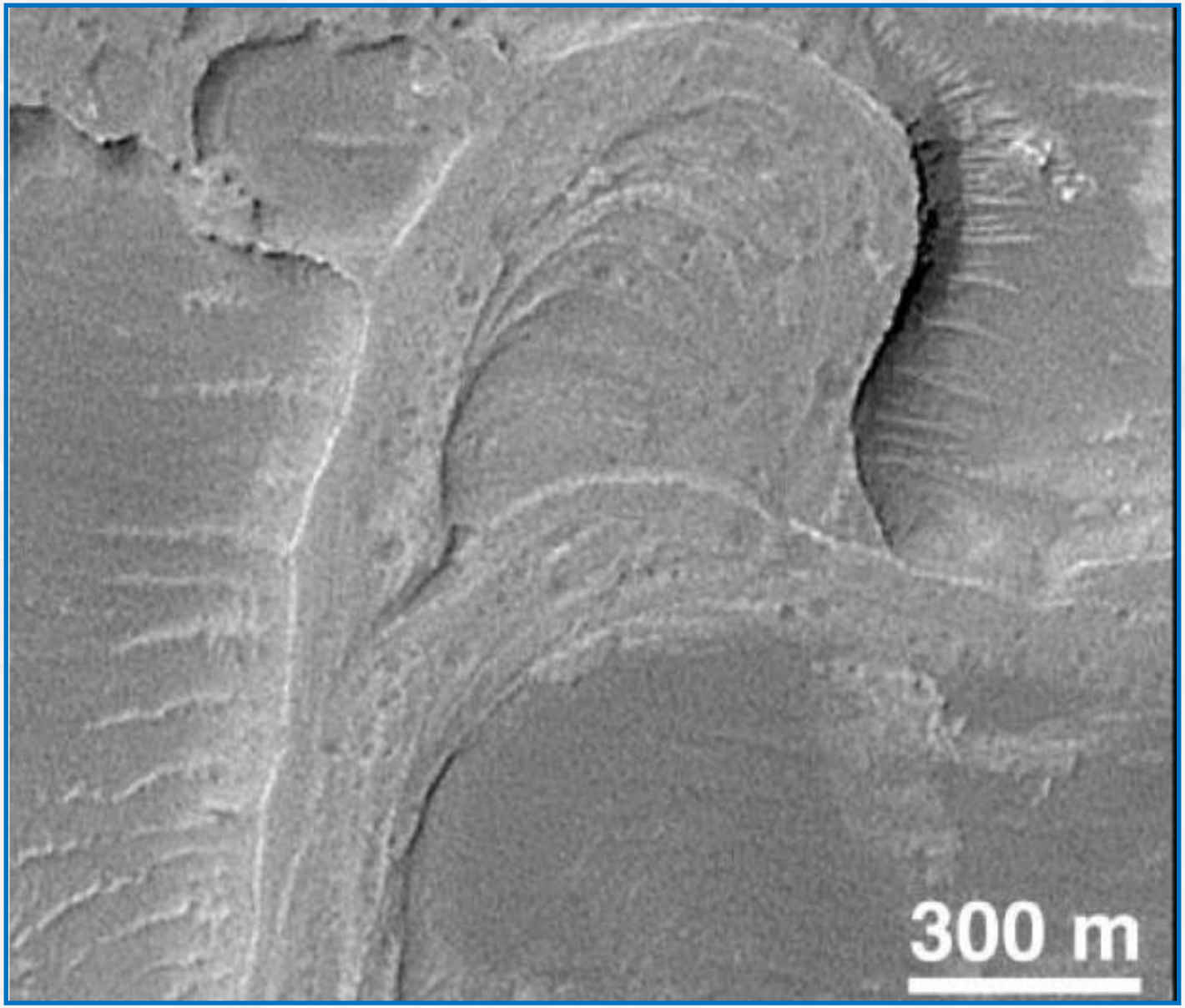
Possible links between Bank Swallow habitat, population decline and meander migration rates, and the potential implication for management

Eric Larsen (UC Davis)
Frank Poulsen (ESSA Technologies)

Outline

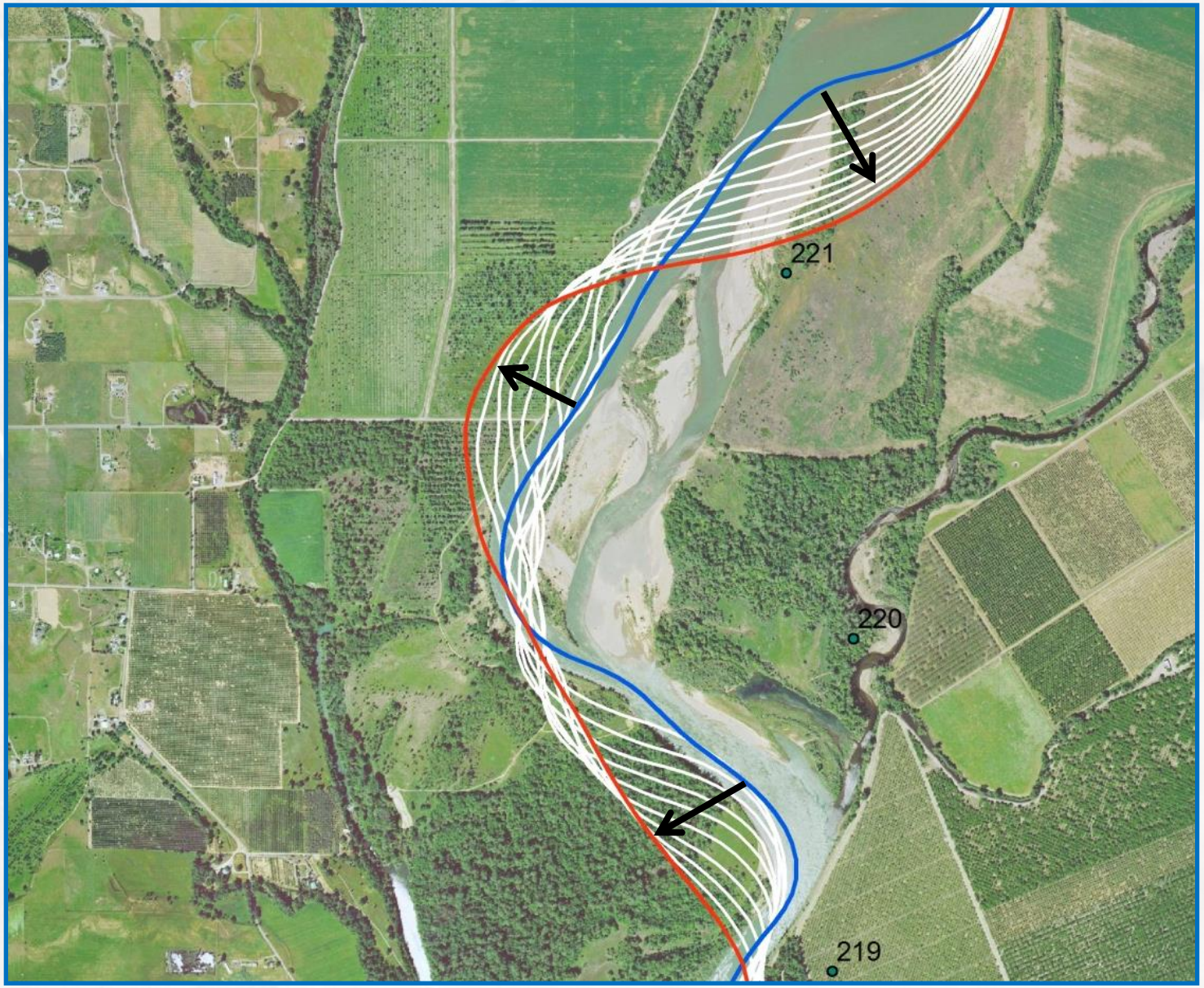
- Meander Migration Model
- Bank Swallow Habitat Model
- Habitat and population decline
- Simple colony size model
- Potential implications for management

Meander Migration Model

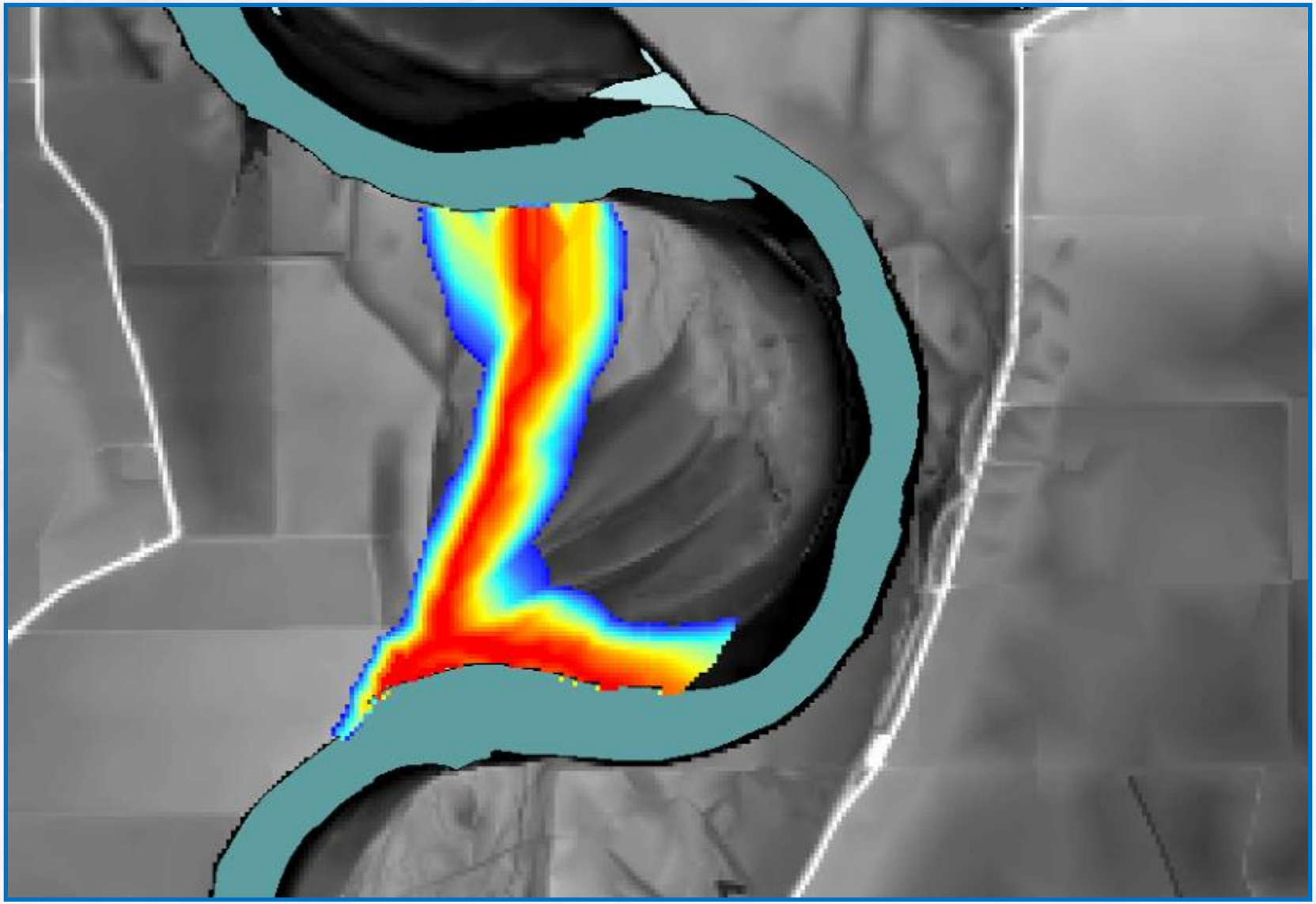


Meander Migration Model

Meander Migration Model

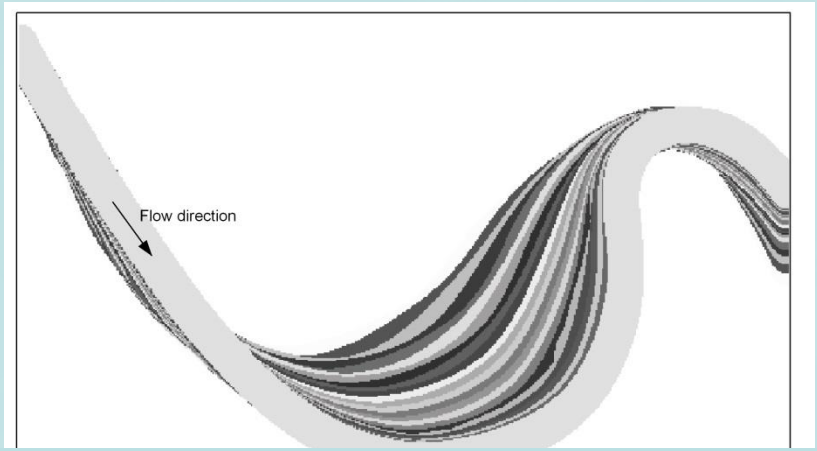


Meander Migration Model



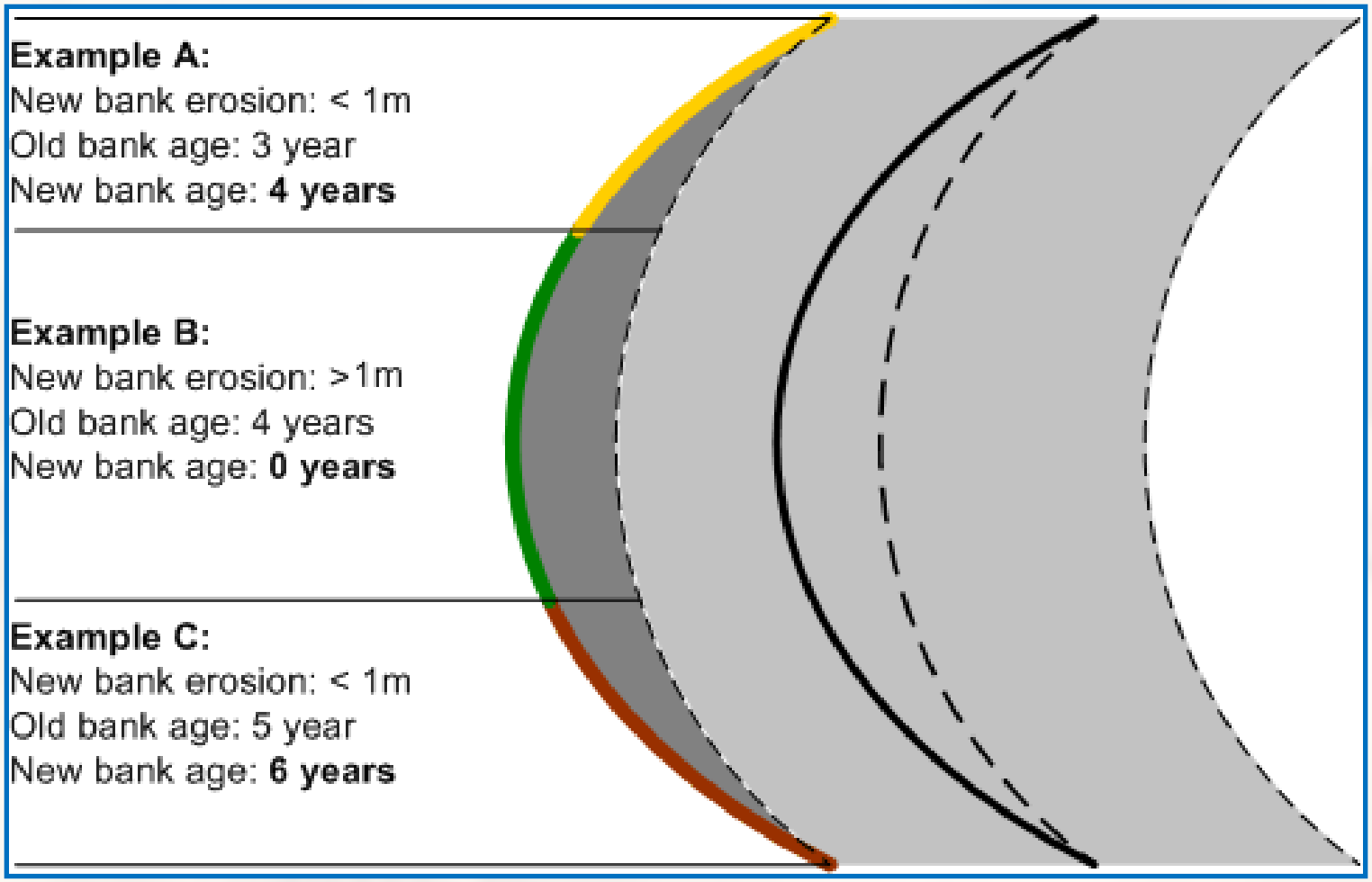
Meander Migration Model

Variable flows



Constant

Bank Swallow Habitat Model

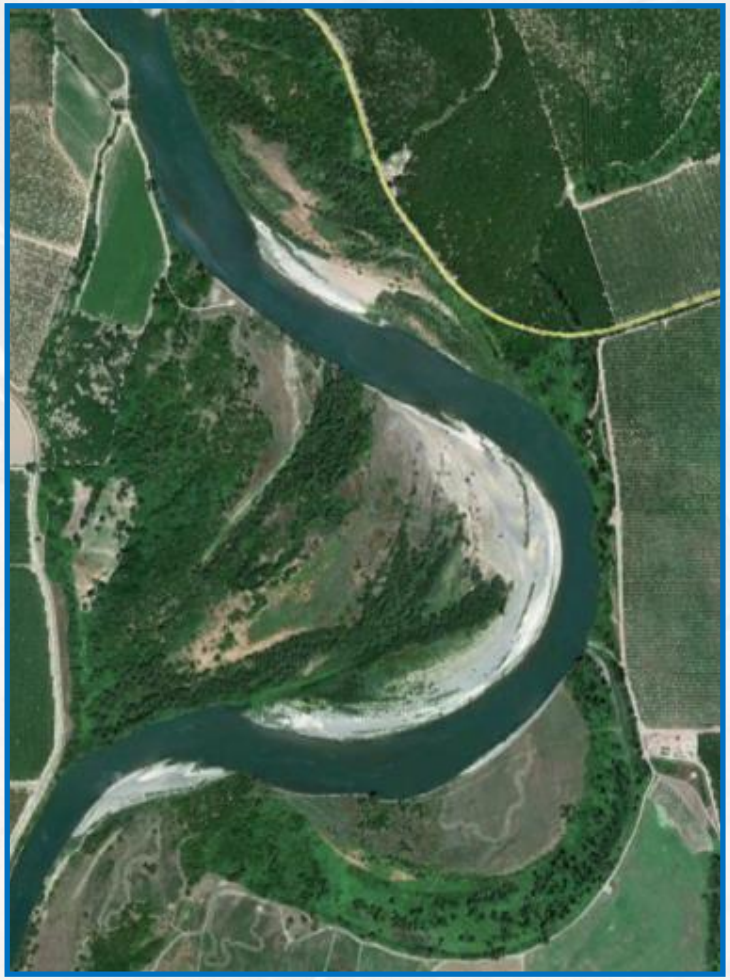


Habitat model is based on burrow reuse

Habitat quality declines after 3 years of reuse

Bank erosion deeper than 1m removes old nests

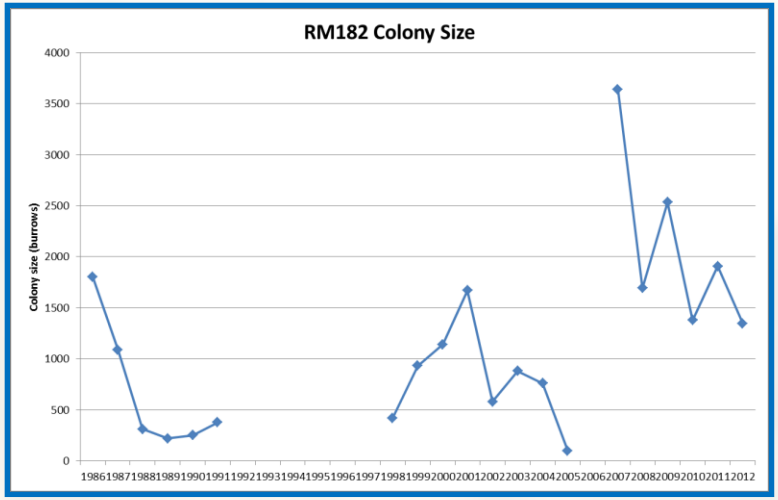
Study Area

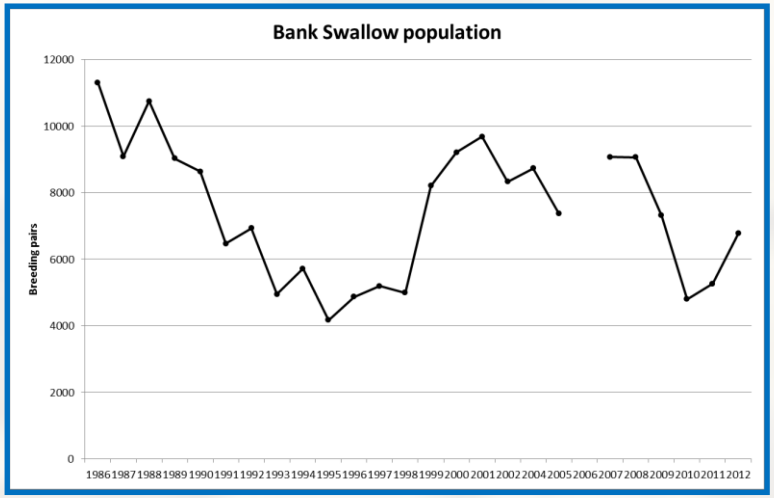


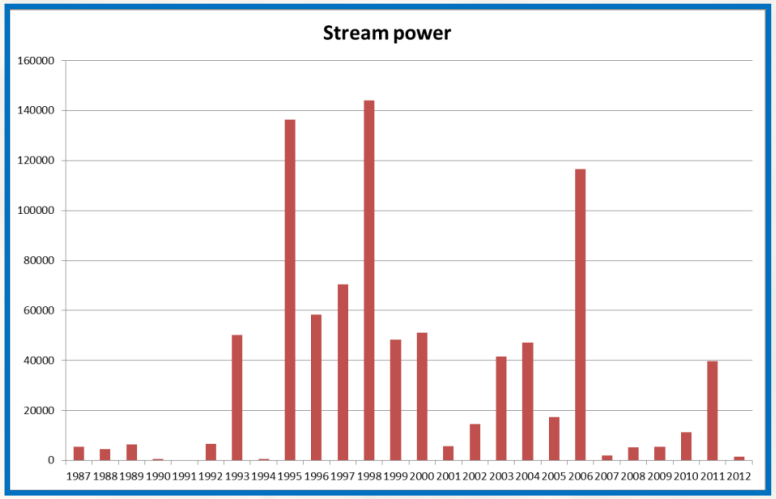
Bank swallow colony at RM182

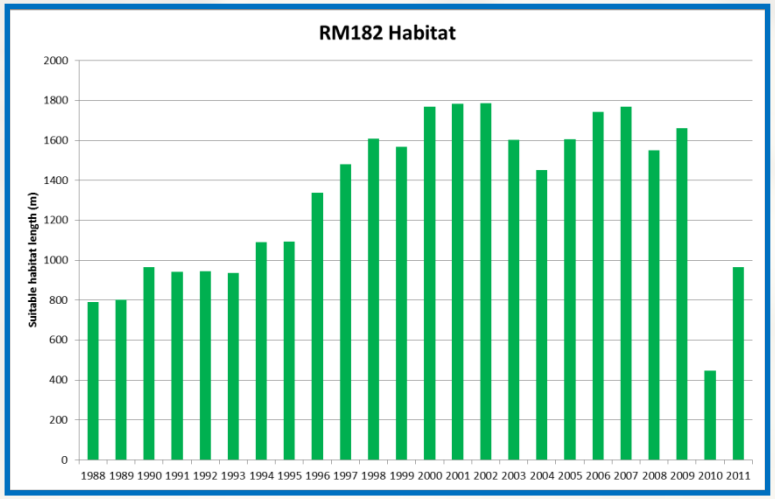
Colony has been persistent since monitoring started

Time series and results







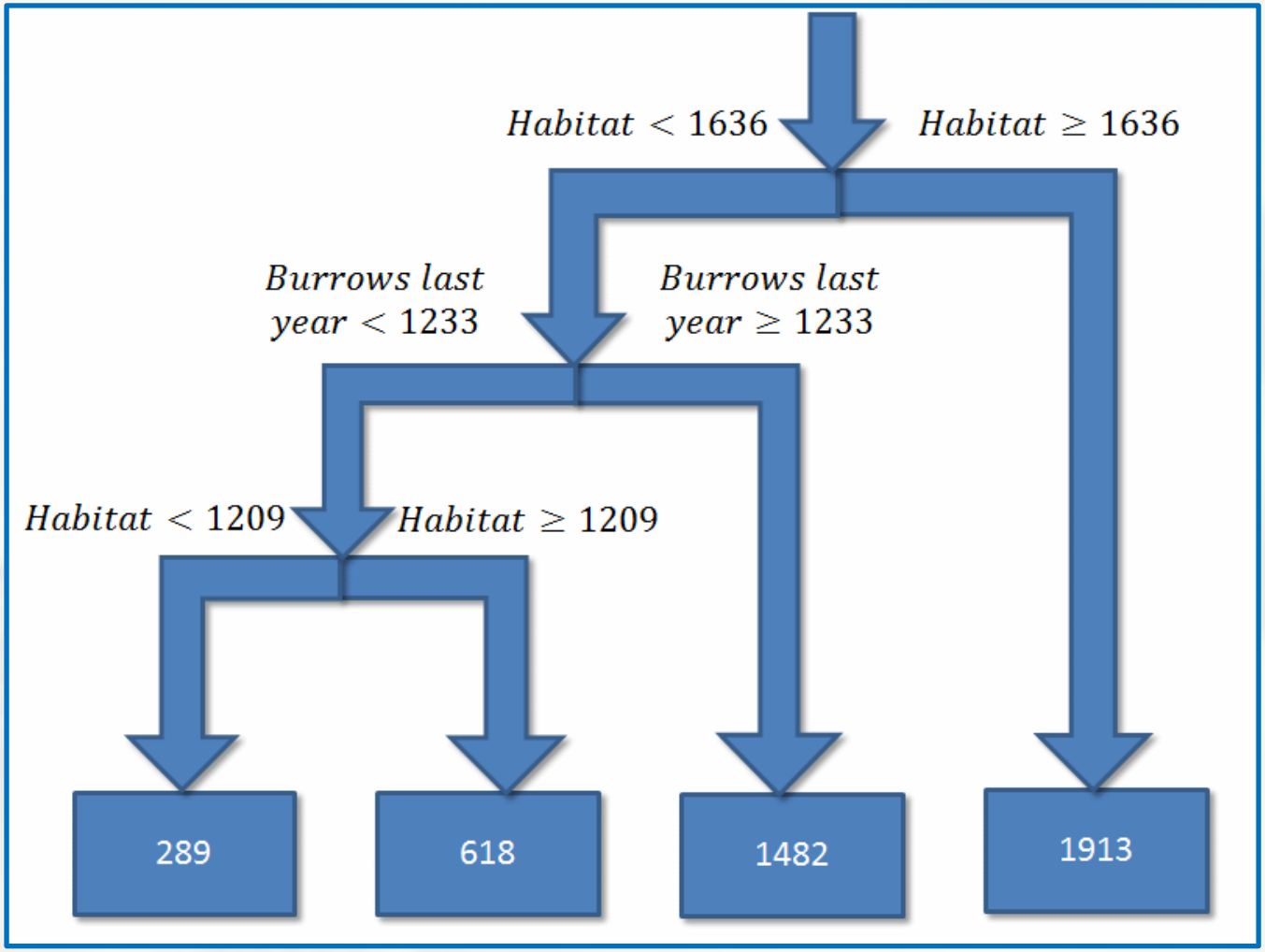


Population decline in early and late in time series, some recovery in late 90s

Coincides with consecutive years of low stream power and poor habitat

Intermediate stream power maintains good habitat

Regression tree for colony size

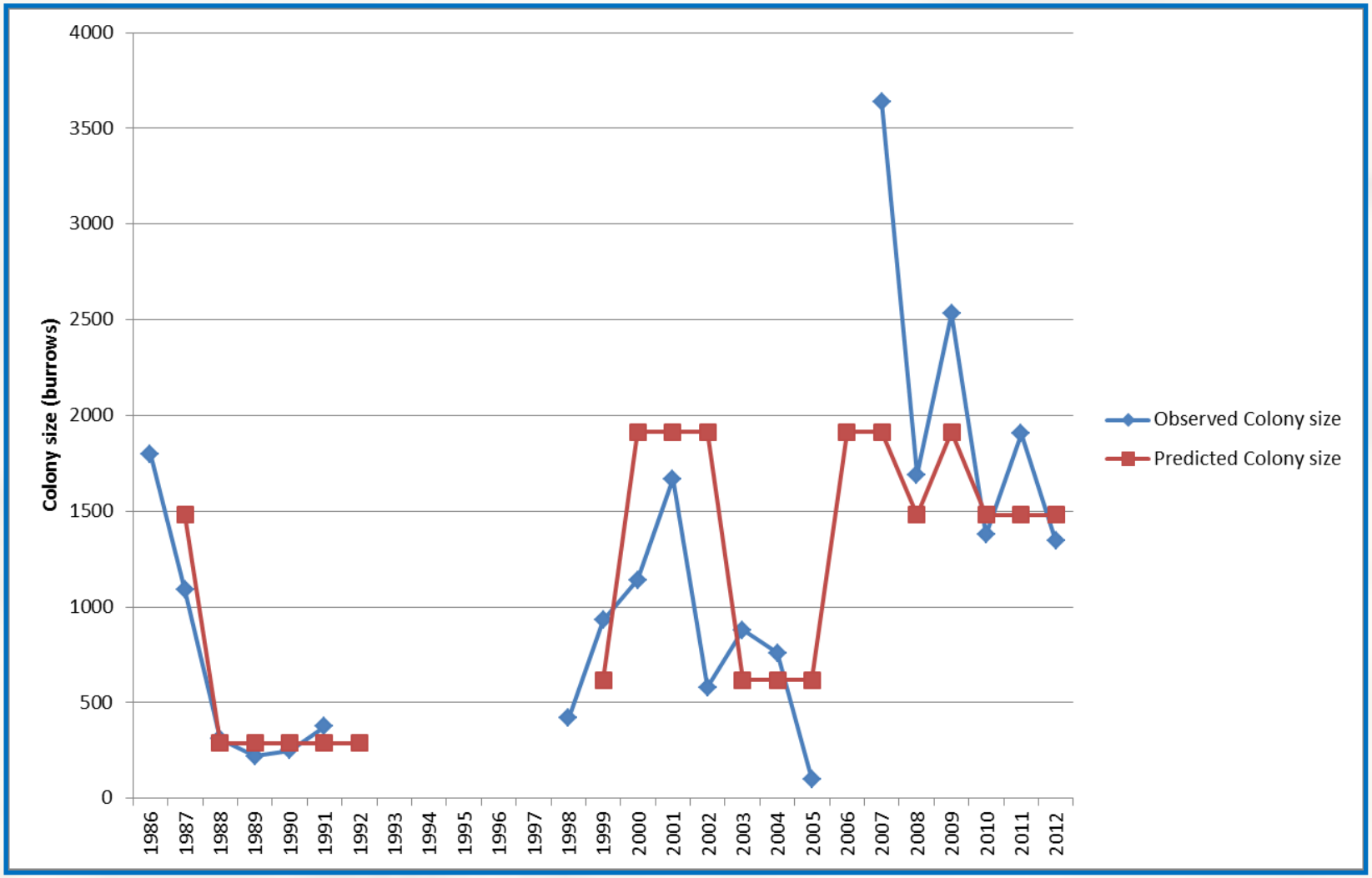


Regression trees find natural breaks in data

Based on habitat quality and burrows last year

Logical breakdown (not guaranteed by model)

Modeled Bank Swallow colony size

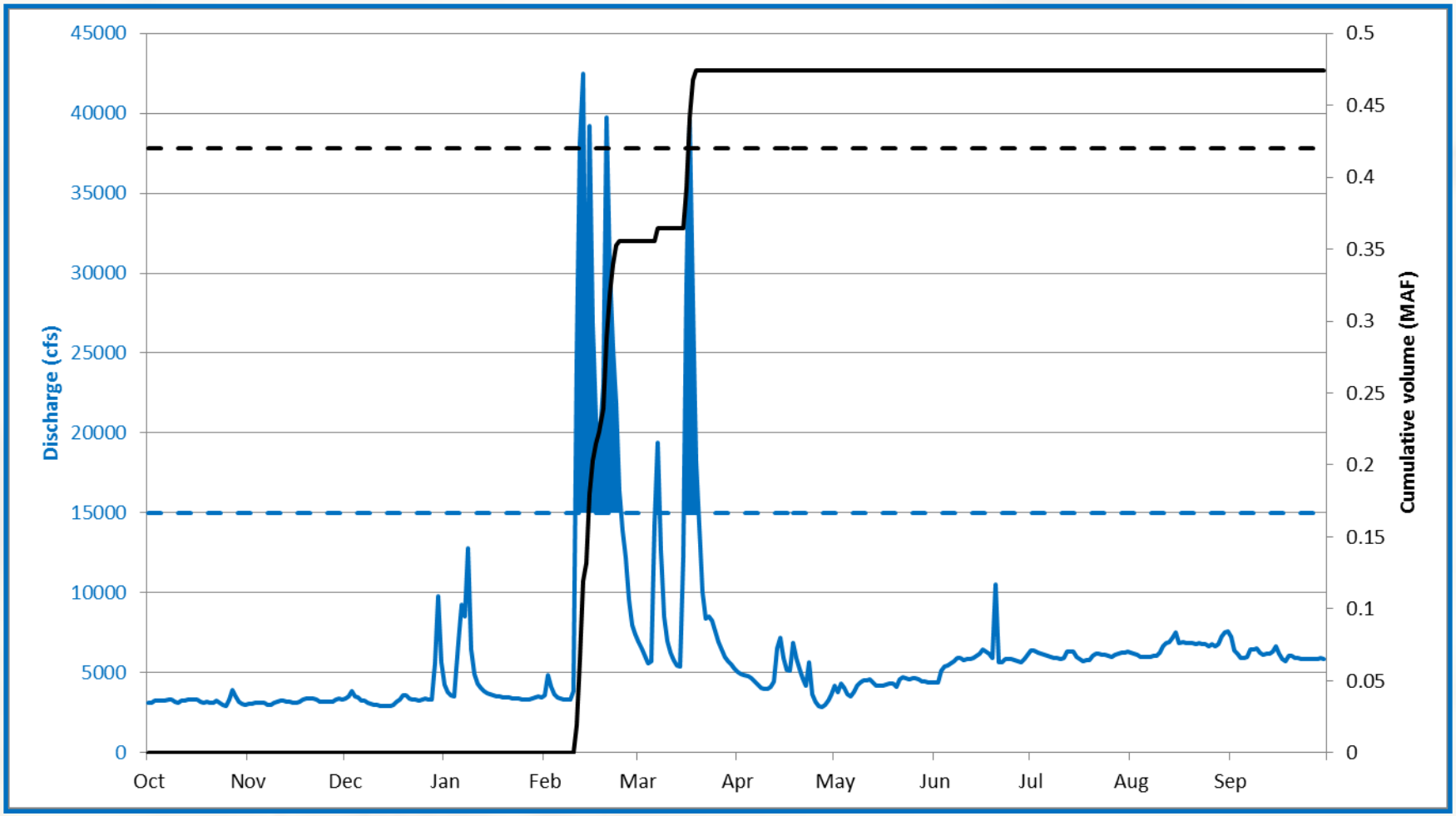


Matches general patterns but not extremes

Supports hypothesis that population decline could be driven by poor habitat

Offers a causal link between low flows and population decline

Potential Implication for Management



Consider pulse flow if habitat not refreshed in preceding two years

Release a volume of 0.42 MAF above 15,000 cfs

Questions?

UC DAVIS
UNIVERSITY OF CALIFORNIA

The Nature Conservancy
Protecting nature. Preserving life.™

ESSA TECHNOLOGIES