

# Other Indicators: Oxbows



## **CALOOSAHATCHEE SCIENCE WORKSHOP FGCU - FORT MYERS**



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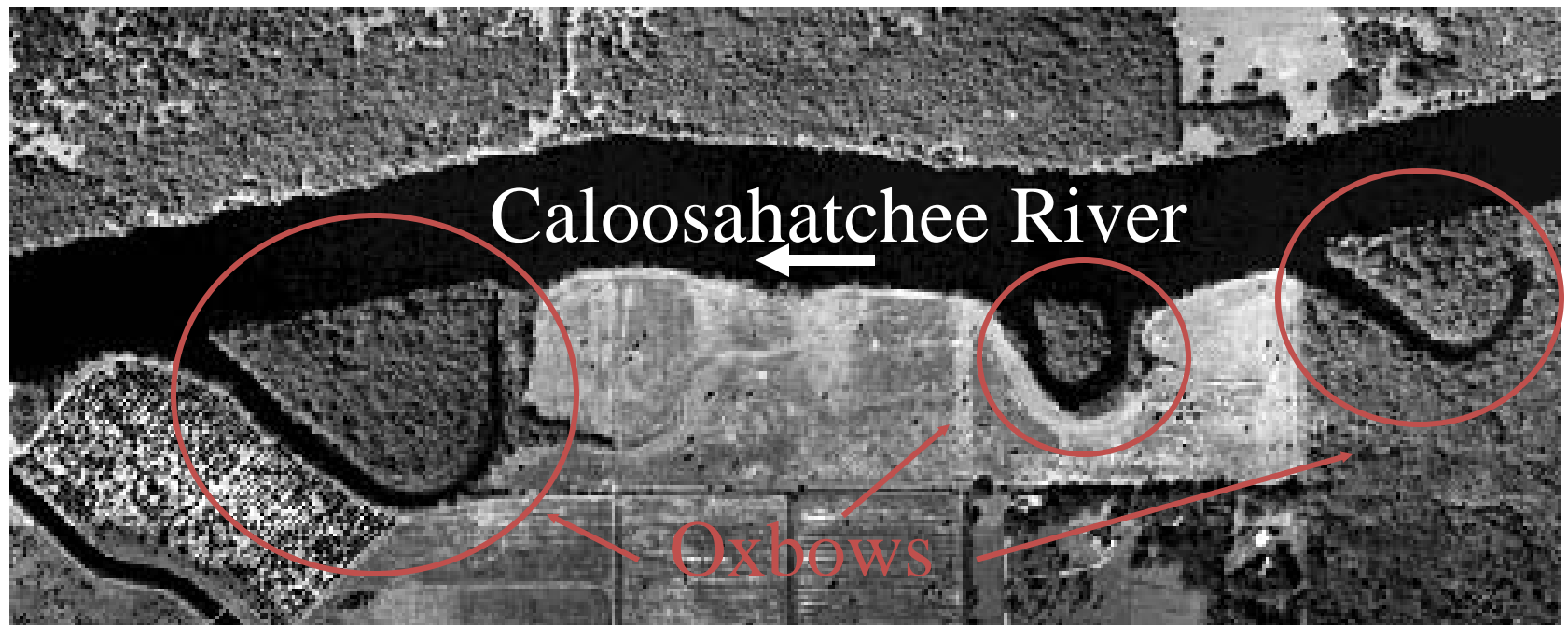
## **Outline**

- **Background Information**
- **Factors impacting the oxbows**
- **What constitutes a healthy/unhealthy oxbow?**
- **Oxbows values**
- **Assessment metrics**
- **Next steps - Further Research**

# Definition



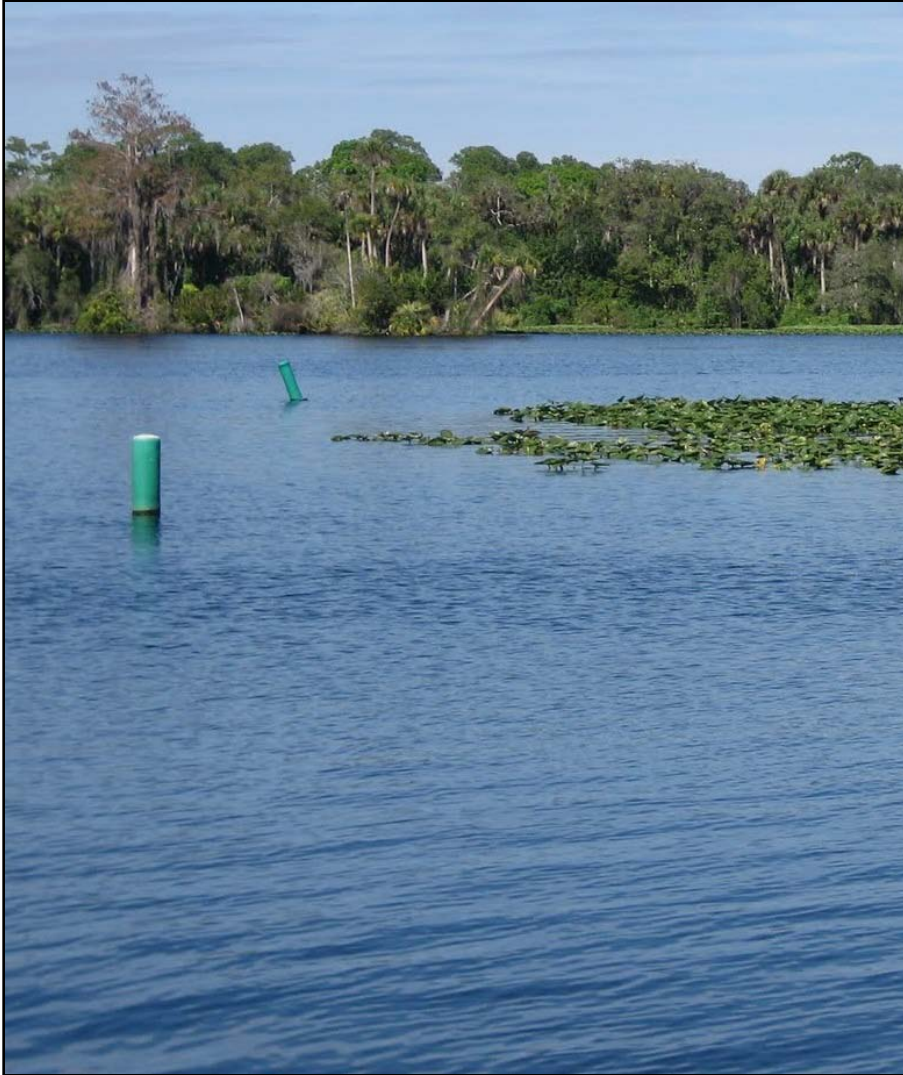
- **Oxbows:** U-shaped water bodies on each side of the river channel, which are the remnant bends of the original river
- Close monitoring of the oxbows provides critical information to the river conditions.



# River

# Aesthetics

# Oxbows



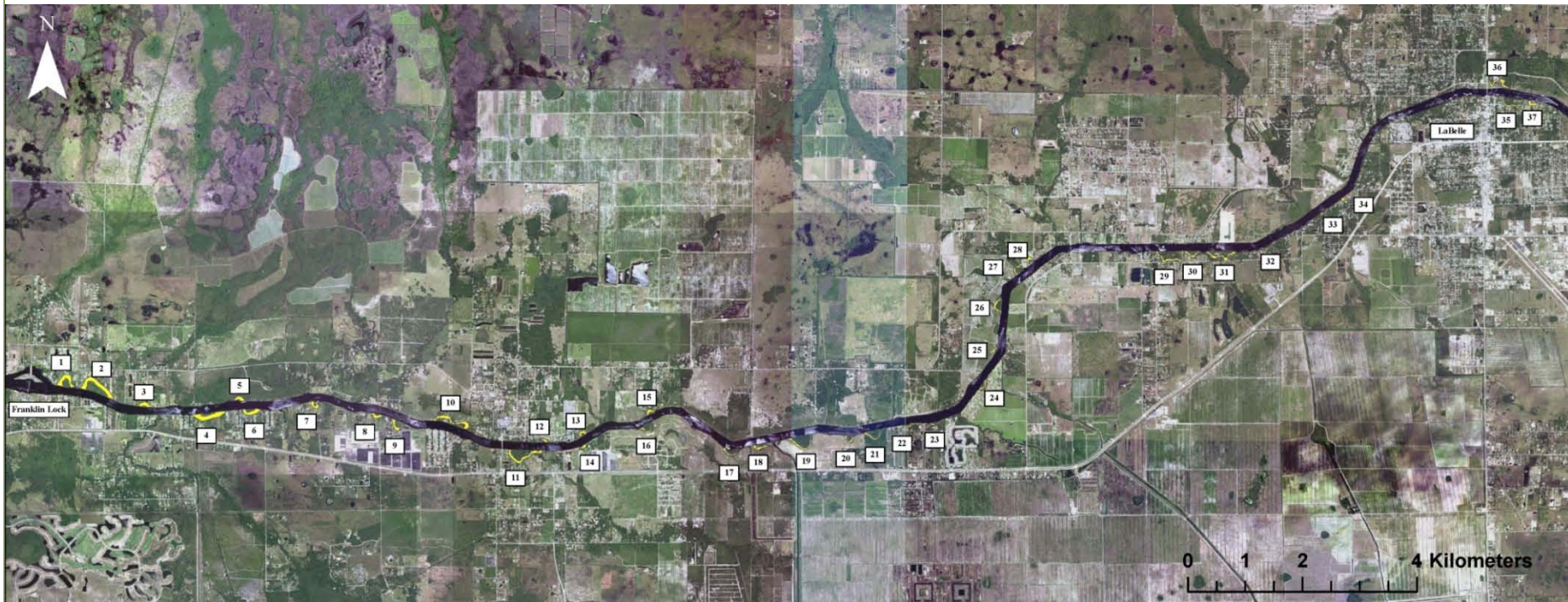
(SDS, 2003)



# Location



37 oxbows located between Franklin Lock and the City of LaBelle

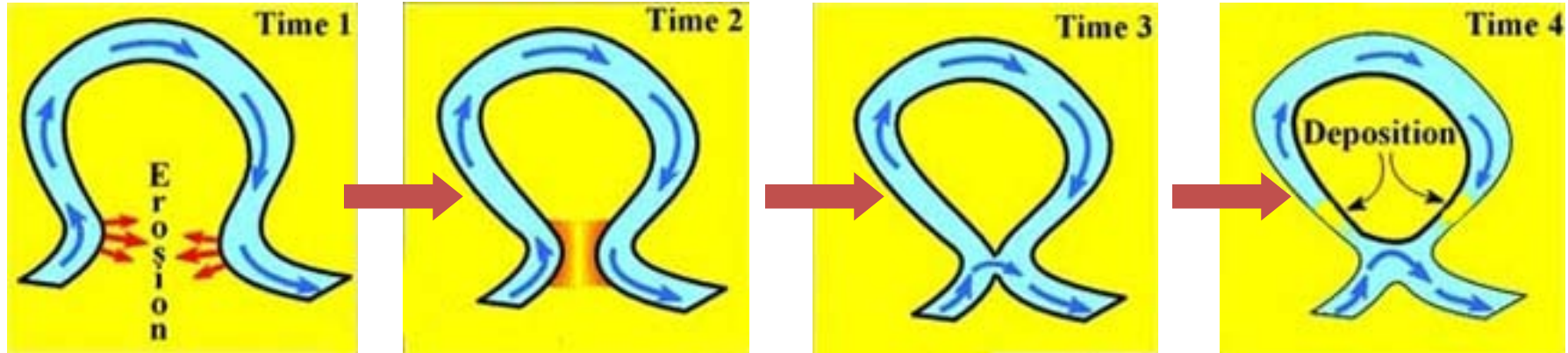


Source: USGS Ortho-images

# Natural processes

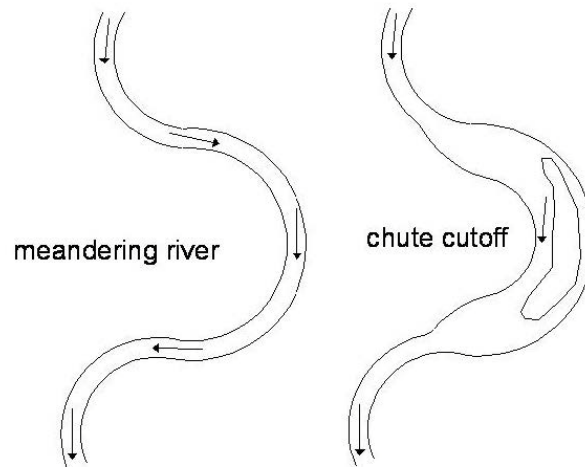


## Neck cutoff



(SDS, 2003)

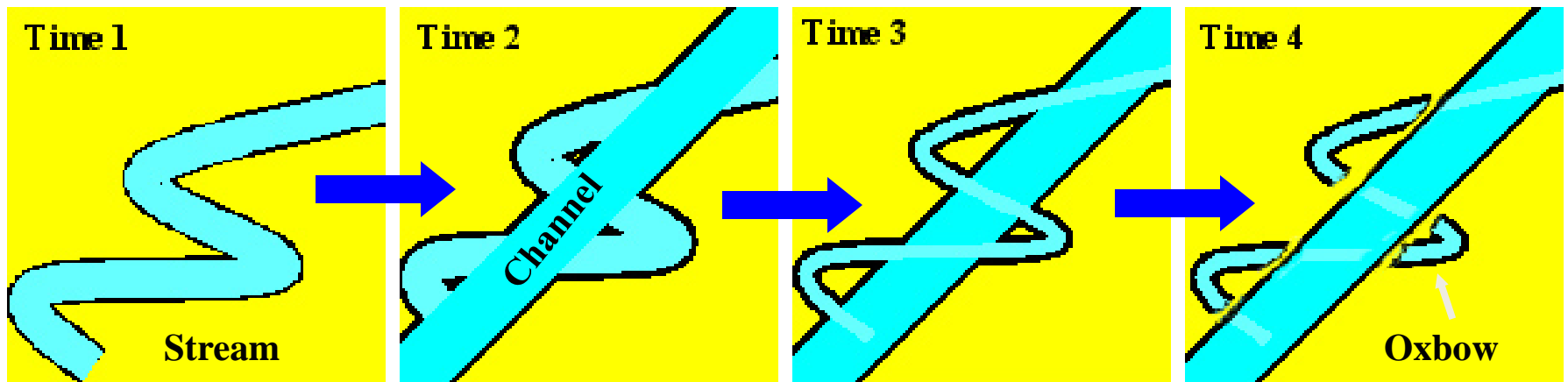
## Chute cutoff



4 phases:

- Bend preparation
- Short circuit
- Oxbow lake
- Infill

# Manmade processes



(SDS, 2003)

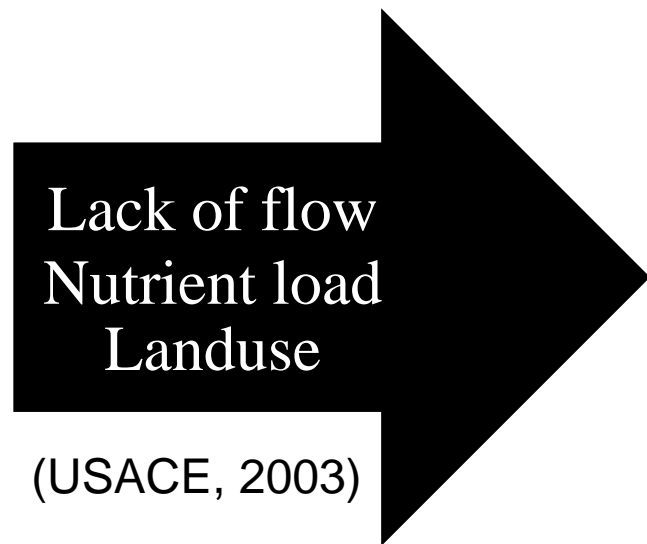




15 oxbows disappeared between 1944 and 1980 with the widening of the channel

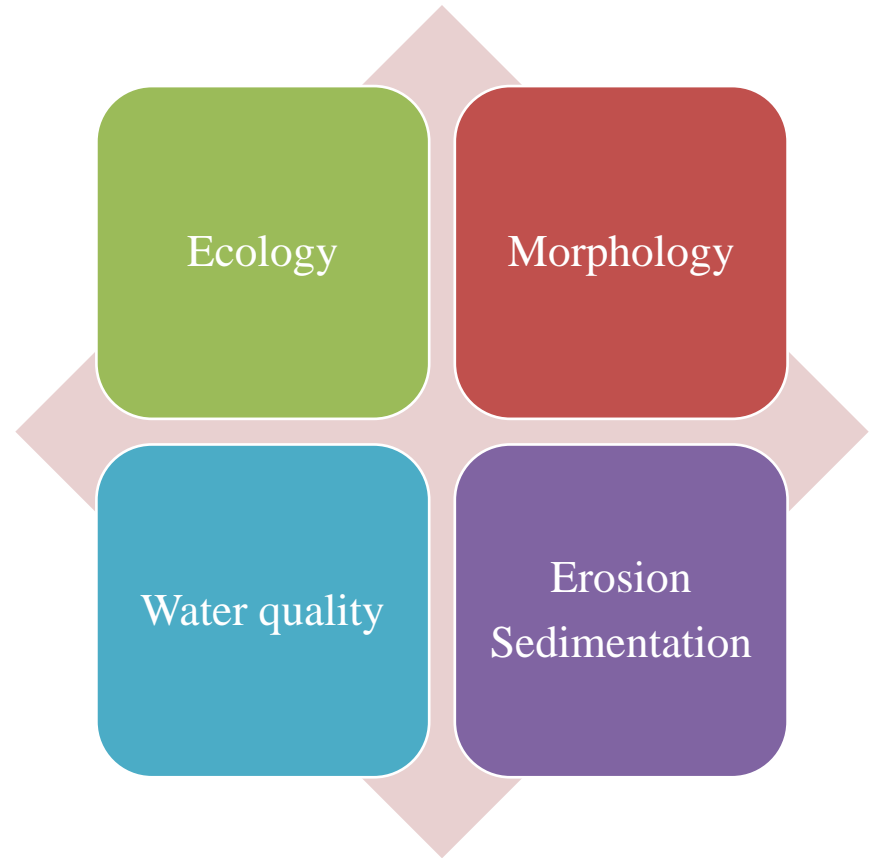


# Caloosahatchee River oxbow conditions



Lack of flow  
Nutrient load  
Landuse

(USACE, 2003)



Ecology

Morphology

Water quality

Erosion  
Sedimentation

# Degraded conditions



# Oxbows value



Ecological

Educational



Historical

Recreational





# Caloosahatchee River Restoration projects



Priority	Oxbow	County	Land Owners	Island PIII numbers	Public Entity	Island Public Fraction	Island Area (acres)	Land Shore Public Length ratio	Closed or Open	Deeded Blockage	Shore	Orientation	Length (feet)	Wet	Dry	Docks	Obstructions	Photo ID	open or closed	public land on the shore	obstruction	deeded public land on the island	number of landowners	obstructions	score
1	35.0	Hendry	4	2 29 43 02-500-0000-016.0	SFWMD			0.81	Middle	No	South	poor	1080	50	1030	0	No	35	30	25	0	5	6.0	5.0	71.0
2	35.5	Hendry Glades	3	129 42 32 A00-0080.0000	SFWMD	44%	5.0	0.54	Down	Yes	North	neutral	1590	1475	115	17	No	36	30	20	0	4.4	7.0	5.0	66.4
3	17	Lee	1		No	100%	3.9	0.14	Vegetation	No	South	neutral	395	375	20	0	No	17-1 17-2	30	0	10	8.9	9.0	5.0	62.9
4	21	Hendry	1	128 43 20 A00 0008.0000	No	40%	5.7	0.21	Up	No	South	neutral	1400	1175	225	0	No	21	30	0	10	4.3	9.0	5.0	58.3
5	24	Hendry	3	128 43 21 A00 0007.0200	No	97%	0.9	0.35	Middle	No	South	neutral	700	620	80	0	No	24	30	0	10	5.7	7.0	5.0	57.7
6	32	Hendry	2	128 43 12-A00-0017.0000	No	66%	1.5	0.00	Middle	No	South	neutral	835	835	0	0	No	32-1 32-2	30	0	10	4.3	8.0	5.0	57.3
7	36	Hendry	12	2 29 43 04-A00-0003.0000	No	99%	8.3	0.31	Up	No	South	poor	1680	1370	310	2	No	37	30	0	10	13.2	-2.0	5.0	56.2
8	18	Hendry	1	128 43 19-A00-0003.0000	No	100%	2.2	0.16	Up	No	South	neutral	1410	995	415	0	land arm	18-1 18-2	30	0	10	7.2	9.0	0.0	56.2
9	16	Lee	5	26-43-27-04-0000L.0000	No	66%	3.8	0.00	Up		South	neutral	1180	915	265	0	No	16	30	0	10	5.8	5.0	5.0	55.8
10	23	Hendry	4	128 43 20-A00-0003.0000	No	38%	0.5	0.00	Vegetation	No	South	excellent	550	550	0	0	No	23	30	0	10	2.1	6.0	5.0	53.1
11	27	Hendry	5	128 43 16 A00-0004.0100	No	37%	2.4	0.29	Up	No	North	neutral	875	775	100	0	No	27-1 27-2	30	0	10	2.7	5.0	5.0	52.7
12	33	Hendry	1	129 43 07-A00-0006.0100	No	87%	4.8	0.09	Up	Yes	South	good	1340	1240	100	0	No	33	30	0	0	8.6	9.0	5.0	52.6
13	29	Hendry	8	128 43 11-A00-0015.0000	No	27%	12.9	0.08	Middle	Yes	South	neutral	2385	2365	20	1	No	29	30	0	10	4.8	2.0	5.0	51.8
14	35	Hendry	17	2 29 43 02 550 000F-0010	SFWMD	0%	6.2	0.33	Up	Yes	South	poor	2270	0	2270	0	No	35	30	20	0	0.0	-7.0	5.0	48.0
15	31	Hendry	8	128 43 11-A00-0001.0000	No	44%	8.0	0.14	Middle	No	South	good	1920	1900	20	1	dock up	31-1 31-2	30	0	10	5.7	2.0	0.0	47.7

# Restoration



Excavation / Dredging



Removal of exotic plants  
and native planting



Riverbank  
stabilization/oxbow  
reorientation

# Assessment metrics



## *Water quality*

- DO
- Turbidity
- Phosphorus
- Nitrate

ARC, 2009;  
Julien, 2008

## *Biotic Components*

- Macro-invertebrates
- Amphibians
- Reptiles
- Fishes

Merritt et al., 2002;  
ARC, 2009;  
SFWMD, 2005

## *Geomorphology*

- Core samples
- Cross section survey

Milleson, 1979; Aerostar  
Environmental Services, 2011

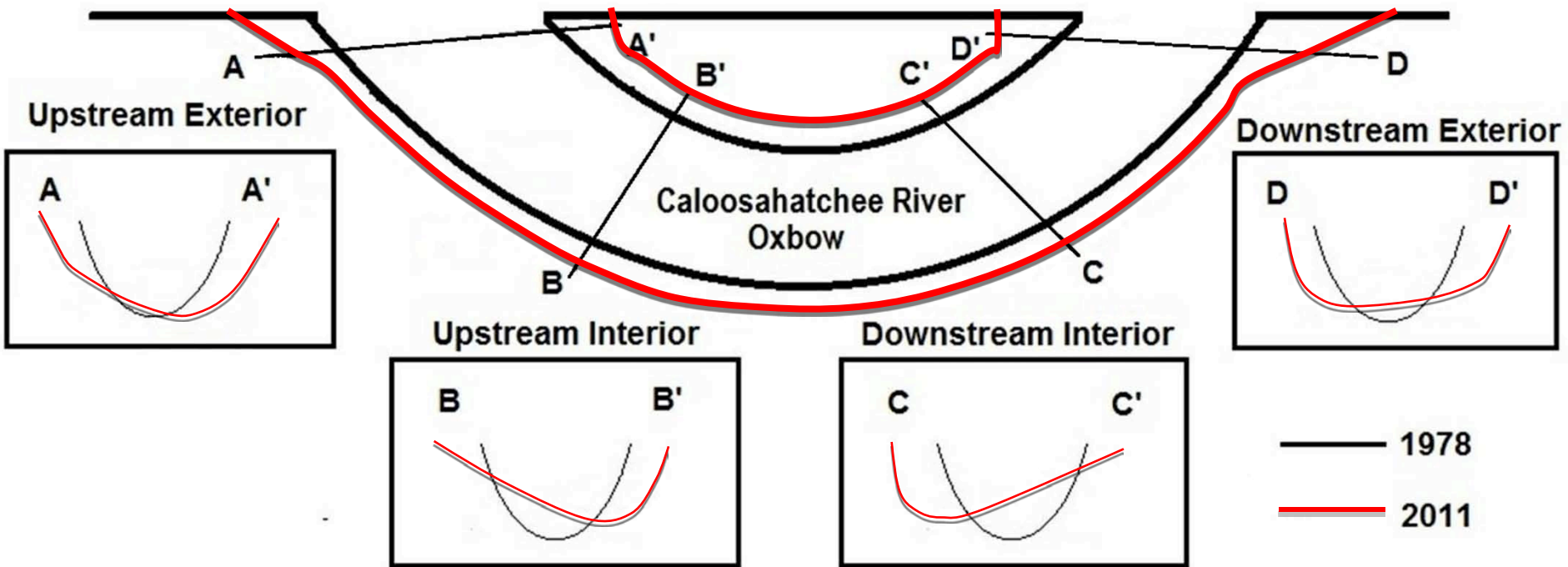


# Evolution Analysis

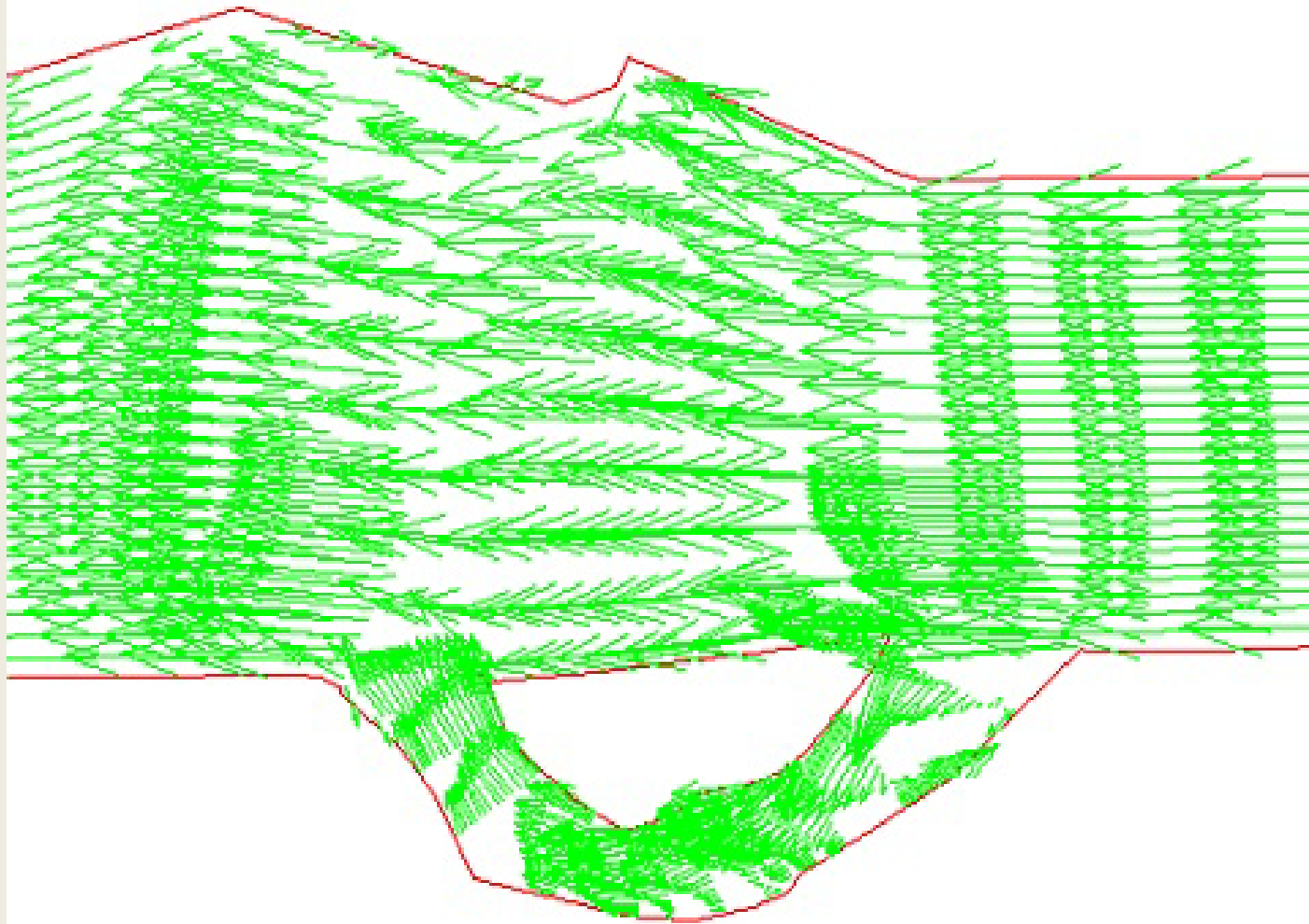


C-43 Canal

Flow →



# Flow measurement



# Flow measurement

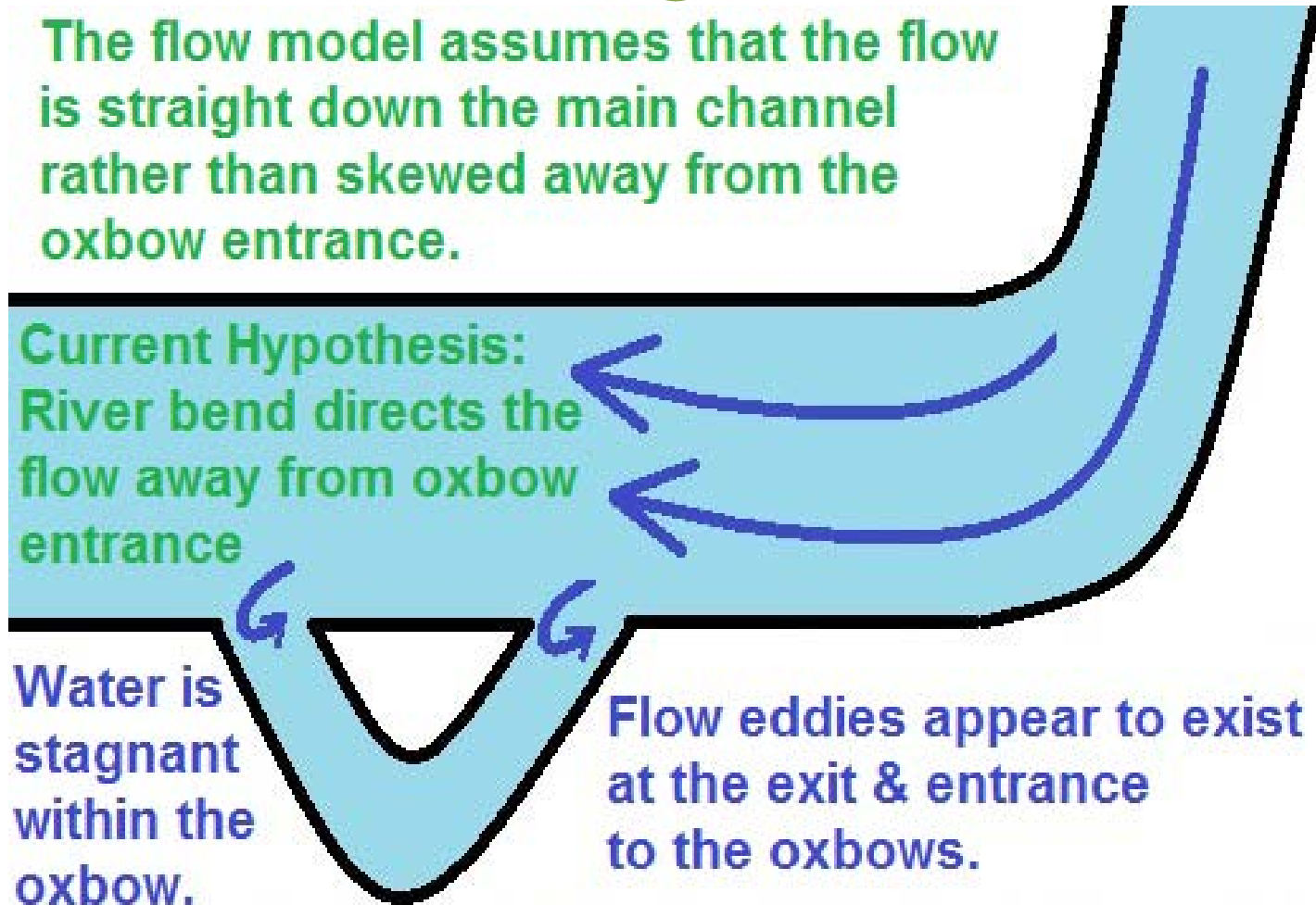


The flow model assumes that the flow is straight down the main channel rather than skewed away from the oxbow entrance.

Current Hypothesis:  
River bend directs the flow away from oxbow entrance

Water is stagnant within the oxbow.

Flow eddies appear to exist at the exit & entrance to the oxbows.





# Next Steps – Further Research



- Continuous monitoring
- Additional field data collection
  - Longitudinal survey
  - Erosion rates estimation
  - Water quality analysis
  - Sediment analysis
  - Ecological surveys
  - Flow measurement





Thank you for your attention