


Cursory Geomorphologic Evaluation of the Apalachicola River

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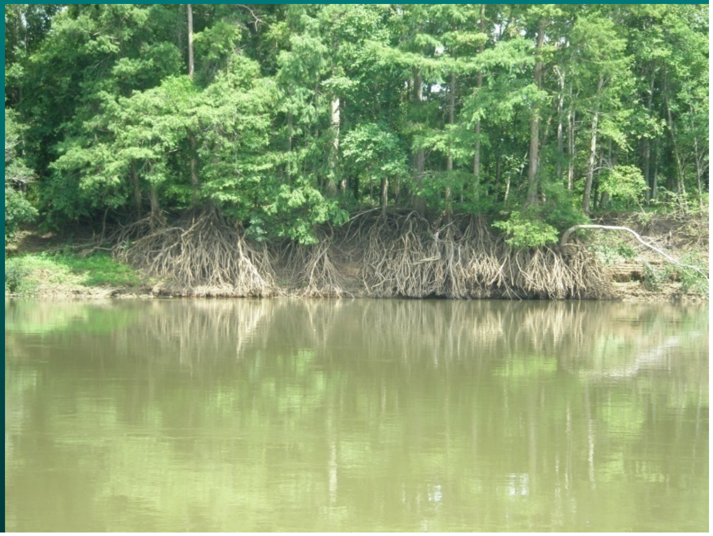


Observations

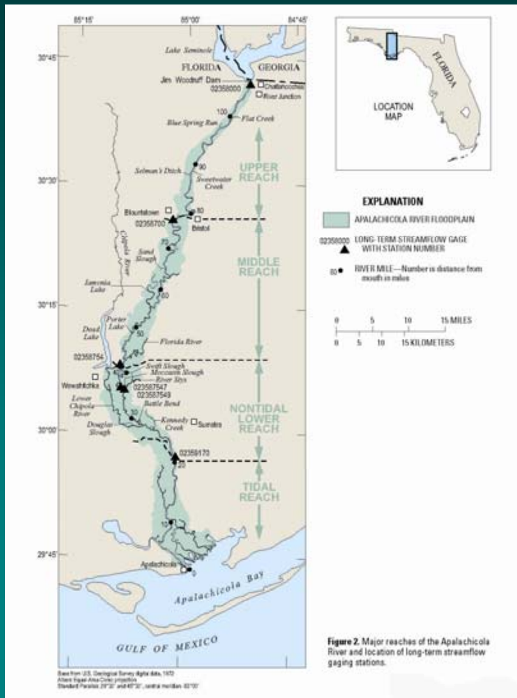
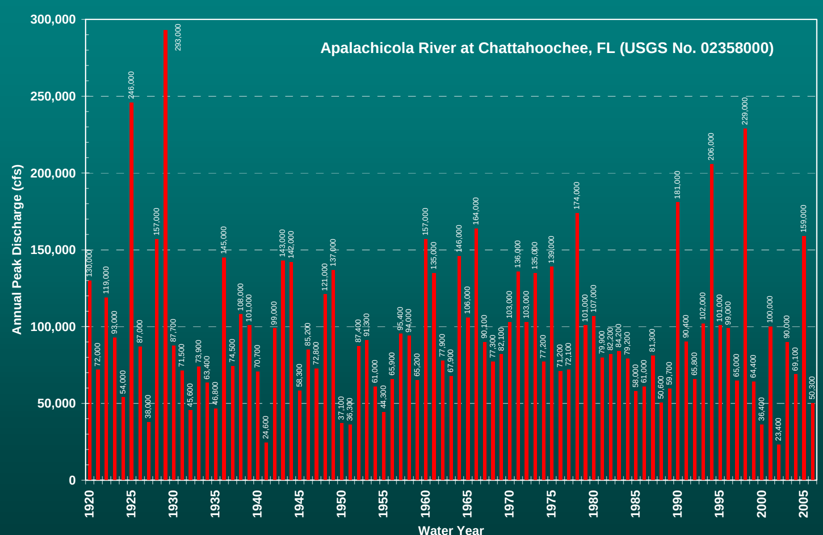
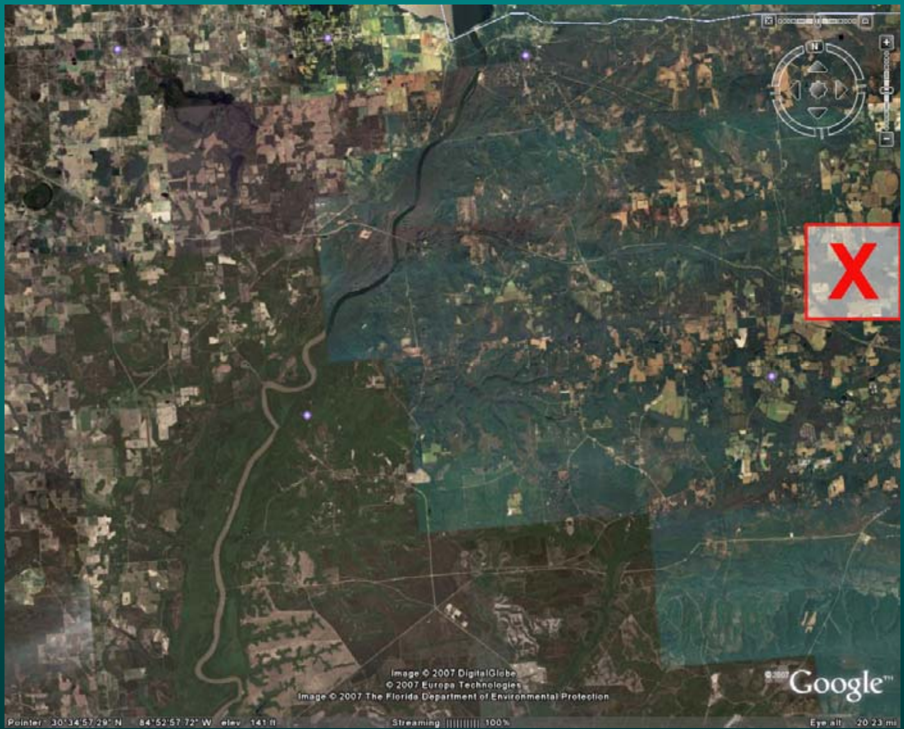


Figure 2. Major reaches of the Apalachicola River and location of long-term streamflow gaging stations.



- The flow regime (based on pre-and post-dam flow duration curves) downstream of Jim Woodruff Dam has not been changed significantly between the pre- and post-dam periods.
- The primary impact of Jim Woodruff Dam on the downstream channel appears to be the trapping of bed material sized sediments.
- The amount of bed material that is transported through Jim Woodruff Dam is not known.
- Other alterations impacting the Apalachicola River include localized meander cutoffs, distributary flows, channel training structures, maintenance dredging, and the cessation of maintenance dredging in the 2000 timeframe.

Observations



- **The degradational response due to the dam appears to extend downstream to about RM 77 near Blountstown. About 4 to 5 feet of lowering has occurred in this reach.**
- **Reach 1 (Dam to RM 78) is a relatively straight reach with little sediment stored in the channel, and is controlled in places by local geologic outcrops of limestone.**
- **The streambanks in Reach 1 are predominately composed of cohesive material and bank erosion and channel widening is minimal.**
- **The dike fields in Reach 1 do not contain significant amounts of sediment.**

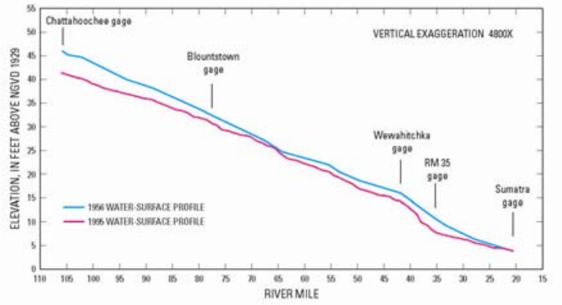
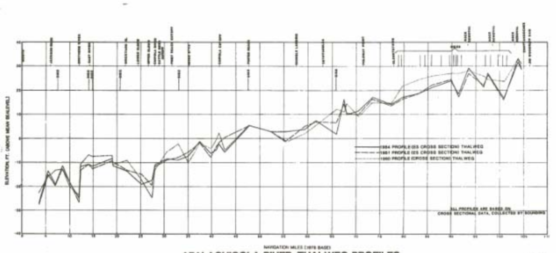


Figure 4. Water-surface profiles developed in 1956 and 1995 for the nontidal reach of the Apalachicola River, Florida, for a discharge of 9,300 ft^3/s at Chattahoochee streamgage. The 1956 water-surface profile is from Plate 43A of Design Memorandum No. 1 (U.S. Army Corps of Engineers, 1955). Design Memorandum No. 1 is dated December 15, 1955 (with transmittal to the Division Engineer December 23, 1955); however, Plate No. 43A is dated March 1956 with the notation: "This Plate is a supplement to Plate No. 43". Apparently computations for this water-surface profile were completed after the report was transmitted and were made an official supplement to the report after-the-fact. The 1995 water-surface profile is provisional (USACE, Mobile District, unpublished data, 2005).

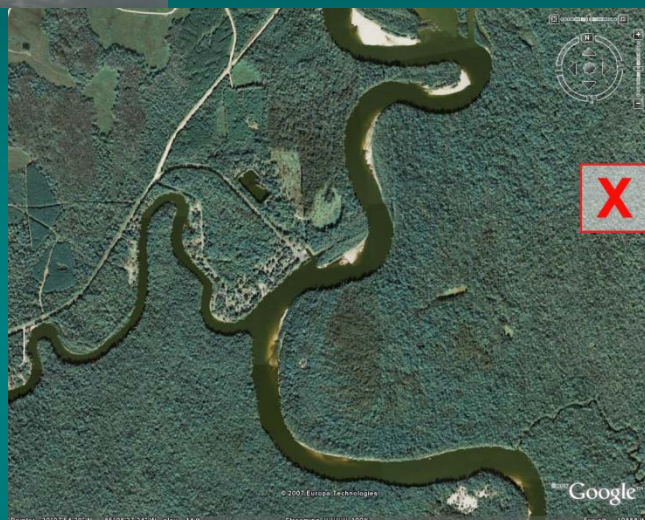
Observations

- The river in Reach 2 (RM 78 to RM 35) downstream of Blountstown is a much more active meandering channel with a high sinuosity (sinuosity =1.9).
- Low water gage records and water surface profiles indicate that the channel between Blountstown and RM 20 has experienced about 1 to 2 feet of lowering. However, comparative thalweg plots between 1960 and the early 1980s indicate that the channel has experienced localized areas of scour and fill.
- Reach 2 has the largest erosion rates on the river. This erosion appears to be part of the natural down-valley meander migration which is common to most meandering streams, and does not appear to be the result of some system-wide adjustments such as degradation, aggradation, or channel widening.



APALACHICOLA RIVER–THALWEG PROFILES

Observations



- The channel between the Chipola Cutoff and RM 35 has been one of the most frequently dredged areas on the river. It appears that little sediment is diverted into the Chipola Cutoff, which might be a partial explanation for the frequent dredging just downstream.
- The processes responsible for the apparent increase in the percent of flow (25% to 34%) diverted at the Chipola Cutoff warrants further study.
- There is considerable sediment storage in Reach 2 as evidenced by the large point bars.
- The effects of the cessation of dredging in the 2000 timeframe on the morphology of the channel warrants further study
- Comparison of the 1941 and 2004 channel widths indicated that channel widening throughout the river down to RM 20. Further analysis is needed to determine if these width increases are real, and if so, what are the factors responsible for them.

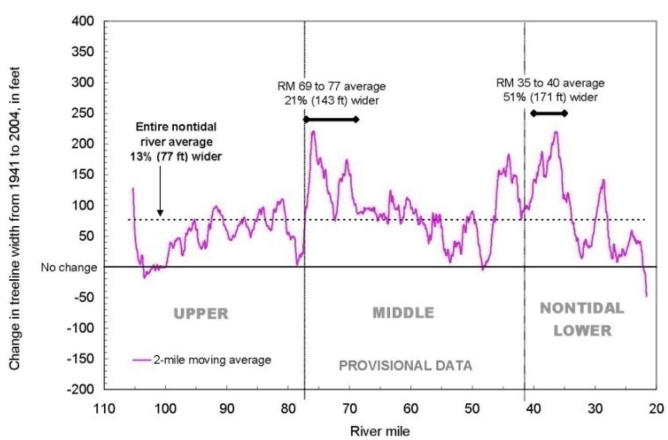
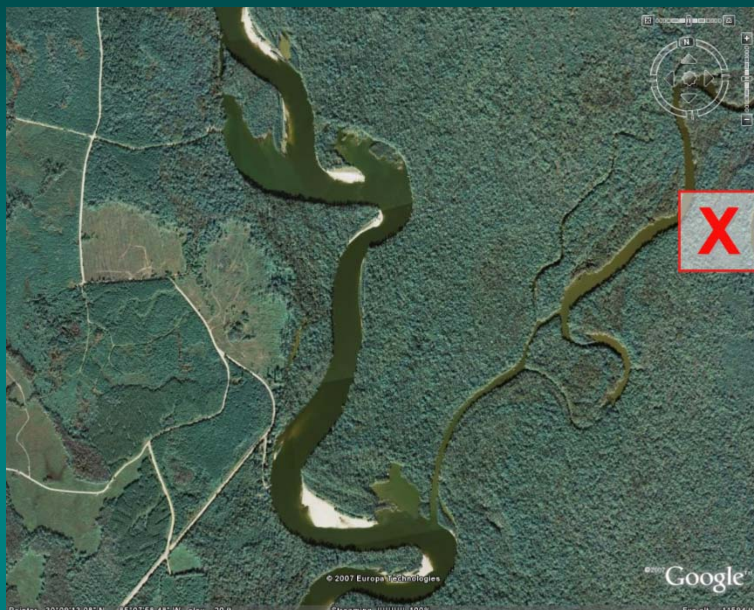


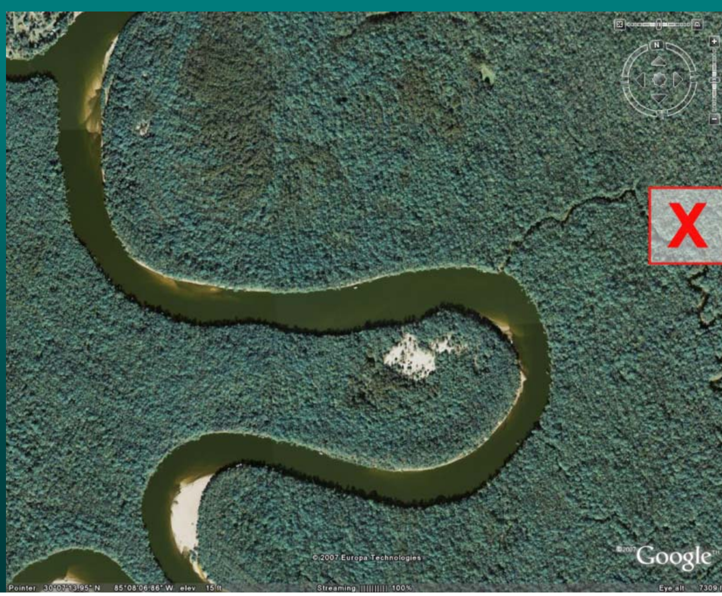
Figure 2. Change in treeline width of main channel of nontidal reach of Apalachicola River, Florida, from 1941 to 2004. Widths were measured at approximately 2,800 points at 164-foot intervals along channel centerline in aerial photographs. Data shows a 2-mile (64-point) moving average. River miles represent those depicted on the most recent USGS quadrangle maps available in 2005.

Observations

- The river downstream of the River Styx (RM 35) has a lower sinuosity (1.3) and less bank erosion.
- Local meander cutoffs downstream of the River Styx may be responsible for some of the bed lowering in this area.
- Preferred mussel habitat appears to occur in the lower energy environments associated with the flow separation zones (eddies) in the transition between meander bends
- The size and location of the eddie zones change with flow and through time as the meanders migrate though the floodplain

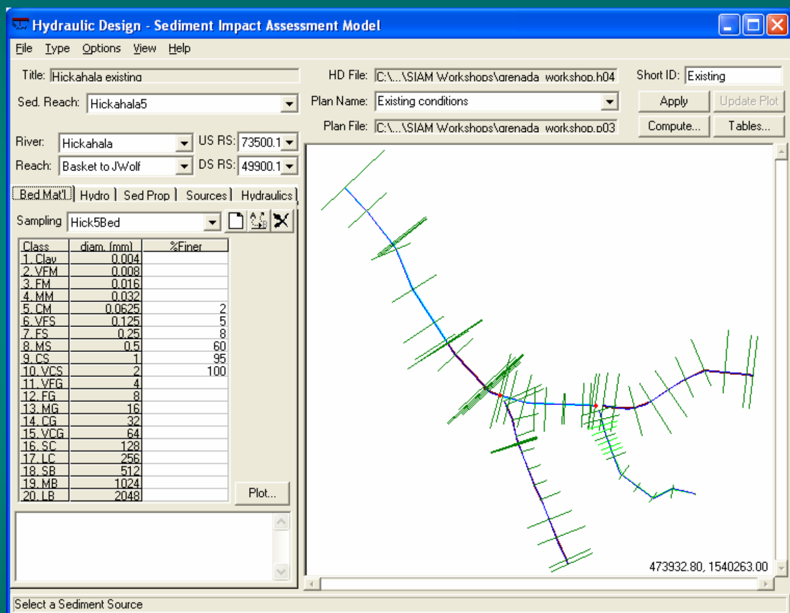
Observations



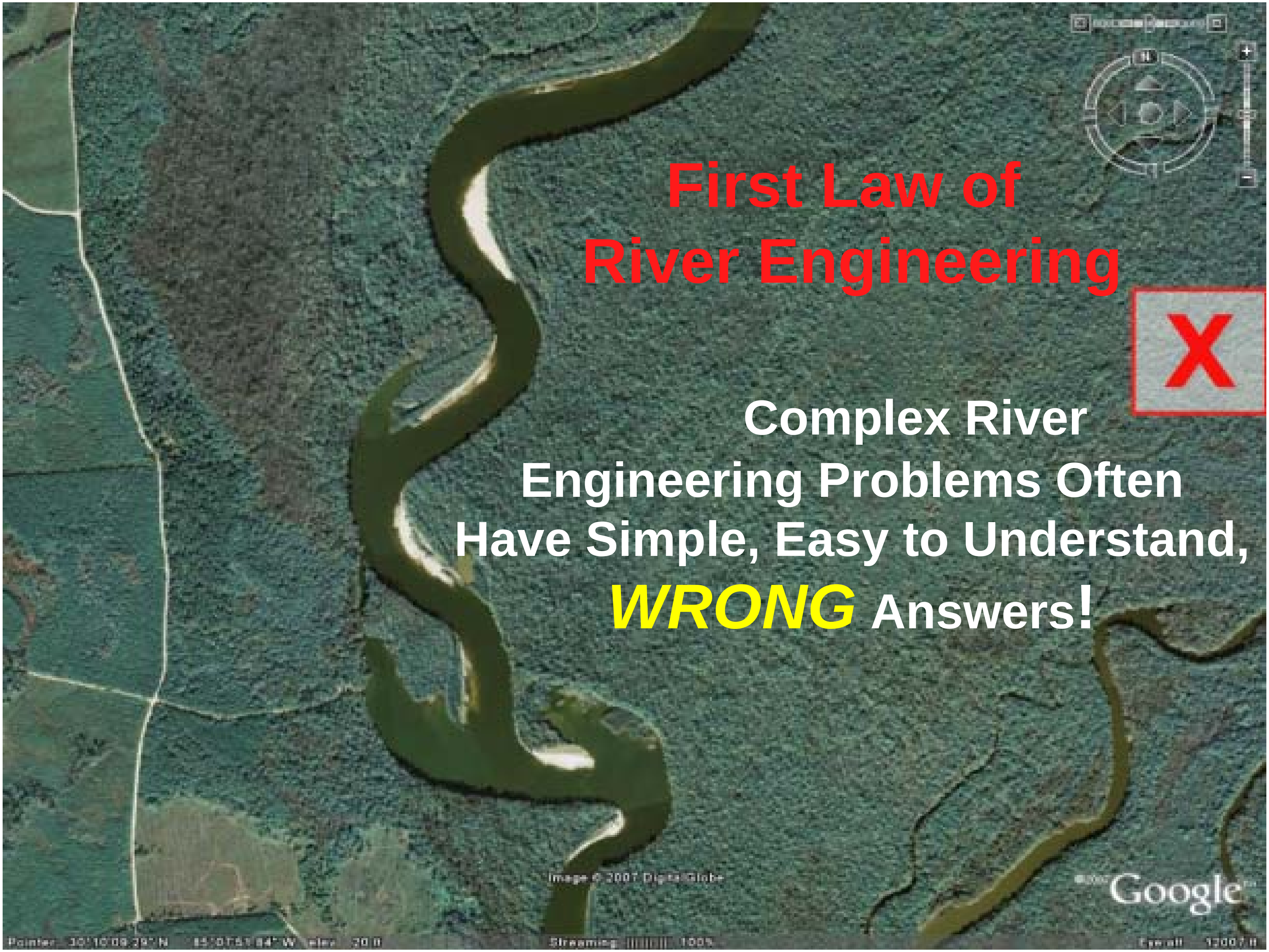


- Reach 2 contains some of the highest mussels counts on the river
- Eddies, and consequently mussel habitat, are constantly being destroyed and created through the natural process of meander migration
- The mussel mortality sites at RM 44.3 and RM 43.6 appear to be the result of the natural migration of the channel and not some systematic channel changes.
- The mussel stranding in Swift Slough appears to be the result of deposition of sands from the river. It appears that a sand bar has moved to the entrance to the Swift Slough and may be the source of the sediment. However, a more detailed analysis of this area is needed to establish the exact processes responsible for this situation.

Recommendations



- Eco-geomorphic assessment of the system to fully develop how the system has responded in the past and where it is today with emphasis on the connection between the morphology and mussel habitat.
- Relatively simple 1D sediment continuity model (possibly SIAM) of the river. This would provide the big picture assessment of the entire river system below Jim Woodruff dam with respect to sediment continuity, channel stability, impacts of flow diversions, etc.
- 2D hydrodynamic model for selected reaches. Once again the key would be linking these detailed hydrodynamic processes to the mussel assemblages


First Law of
River Engineering
X
Complex River
Engineering Problems Often
Have Simple, Easy to Understand,
WRONG Answers!
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