1-1-2012

Assessment of the Oxbow Morphology of the Caloosahatchee River and its Evolution Over Time: A Case Study in South Florida

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by

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science
Department of Geography, Environment, and Planning
College of Arts and Sciences
University of South Florida

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Date of Approval:
June 18, 2012

Keywords: Abandoned Channels, Baseline Data, Channelization, Cross-Sectional Survey, River Morphology, River Restoration, Water Management

ACKOWLEDGMENTS

First, I would like to thank my major professor, Dr. Kamal Alsharif, for his continuous availability to help and guide me, Dr. John Capece for his expertise in the domain and his guidance and help, and Dr. Joni Downs for serving on my committee and for her GIS assistance. Much appreciation goes to the University of South Florida for providing the equipment and funding. I would like to acknowledge Robert Neal, Coastal Engineer at Lee County, for his time and dedicated assistance with documentation and data collection. Thanks to Anthony Hernandez from USDA NRCS and Lenny Heisz for their help with the elevation survey. I would like to show my gratitude to Nancy Smith and Dan Morrissey, remarkable people, for hosting me, and for their daily support in this project and their generosity. Thanks to the Caloosahatchee River Citizen's Association for arranging for a host family and for establishing oxbow restoration as a priority of the organization. Thanks to Mr. and Mrs. Conner and Jean Baptiste Thibaut for lending an excellent canoe that was used for the data collection. A very special thanks to Jeremie Sage, my right hand co-worker from beginning to end in the summer data collection, for his daily assistance and support and his long and numerous hours in the field. Without the contribution of Jeremie, Brent Rosenfelder, Sean Foorman and all of the other interns from Intelligentsia International Inc., this extensive data collection would not have been possible. Finally, I would like to thank Maral Saadati for her expertise and insight in statistics, and Monyo Stoev and Elzbieta Bialkowska-Jelinska for their endless support.

TABLE OF CONTENTS

ABSTRACT

The Caloosahatchee River, located in Southern Florida, was originally a meandering and relatively shallow river. During the 1920s, the Caloosahatchee River was channelized and became the C-43 canal. The channelization has significantly impacted the river ecosystem, particularly the oxbows. The oxbows are the U-shaped water bodies on each side of the river channel, which are the remnant bends of the original river. To understand how anthropogenic influence affects hydrologic systems, the proposed case study was designed to assess the geomorphic changes of the oxbows of the Caloosahatchee River, Florida. Understanding and documenting the evolution of river morphology is becoming increasingly important today with increasing river degradation due to anthropogenic activities. In fact, such monitoring will provide critical information regarding river conditions to support future management plans and restoration efforts. Monitoring is a key element of successful management. This study provided a baseline for future monitoring by assessing the current morphologic conditions of the thirty-seven oxbows of the Caloosahatchee River, coupled with GPS data. Bathymetric surveys were used to assess the morphology of the oxbows. The study also presented trends in the evolution of oxbow morphology by comparing the data collected from the survey in 2011 with a cross-sectional survey collected by the South Florida Water Management District in 1978. The study revealed that 21 of 37 oxbows are still open; however, 16 are already partially filled, either at one of the ends or somewhere in the interior. In both 1978 and

2011, oxbows in Lee County were significantly larger, wider and deeper than in Hendry County. Exterior limb cross-sections were significantly larger, wider and deeper than interior cross-sections in both 1978 and 2011. Finally, an attempt to determine trends in the evolution of the morphology of the oxbows demonstrated that the overall maximum depth is significantly decreasing but only in the interior of the oxbow and that the mean depth is significantly increasing but only in the exterior cross-sections. This analysis also showed that the width is significantly increasing throughout the oxbow. Factors responsible for such differences may include natural geomorphic processes, pattern changes due to channelization, land use and anthropogenic activities.