

FLORIDA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

PROJECT STATUS REPORT

1. TITLE: Geomorphic Assessment of Channel Changes along a Modified Floodplain: Pascagoula Basin, Mississippi
2. PROJECT OFFICER: Jim Williams (USGS-BRD), Steven Hrabovsky
(USACE)
3. PRINCIPAL INVESTIGATOR: Joann Mossa
4. CO-PRINCIPAL INVESTIGATOR: None
5. RESEARCH WORK ORDER #: 219
6. FUNDING AGENCY: U.S. Geological Survey/ U.S. Army Corps of Engineers (will contribute and coordinate funding from several agencies including the Pat Harrison Waterway District and the Nature Conservancy)
7. START DATE: 6 /16 / 2002 END DATE: 6 / 15 / 2005
8. REPORTING PERIOD FOR DELIVERABLES:

Progress	August 30, 2002
Progress	December 31, 2002
Progress	April 30, 2003
Interim (Year 1)	June 15, 2003
Progress	August 30, 2003
Progress	December 31, 2003
Progress	April 30, 2004
Interim (Year 2)	June 15, 2004
Progress	August 30, 2004
Progress	December 31, 2004
Progress	April 30, 2005
Final	June 15, 2005
9. ABSTRACT OF PROJECT (maximum 4000 characters): The ramifications of channel changes associated with floodplain disturbances are numerous. This study proposes to examine connections between mining and other major disturbances on floodplains to channel changes in portions of the Pascagoula Basin, Mississippi. Geomorphic changes will be evaluated from a cross-sectional and planform perspective using historic USGS data, historic maps and GIS, and field comparisons of cross sections in both disturbed and undisturbed portions of the floodplain. Cross sections at about 20 locations throughout the basin will be assessed and normalized for comparability and a subset of about 12 stations will be evaluated for aggradation and degradation using gage data. Planform changes will be examined in portions of the Leaf River, Chickasawhay River, Bowie River, Thompson Creek, and Pascagoula River and possibly other tributaries, with reaches selected to assess how channel instability varies with different land uses such as mining, urbanization, agriculture, commercial forestry and natural forests. Spatial patterns and temporal relationships of floodplain changes and

channel instability will be used to evaluate which locations are most unstable, whether modified portions are experiencing more instability than less modified portions, and evaluate cause and effect interactions. Such research is important because channel instability has numerous ramifications to the environment and private and public properties. Elucidating and quantifying these relationships is important in defining and refining state regulations regarding floodplain activities, including those associated with deforestation, agriculture, mining and development.

10. OBJECTIVES OF PROJECT (maximum 4000 characters):

OBJECTIVES FOR YEAR 1: Evaluate spatial and temporal character of floodplain disturbances, evaluate the character and significant events in the basin, analyze historic changes in cross sections, compare spatial variations and timing of long-term changes in channel cross-sections to disturbances

TASKS

Literature review (southeastern rivers, Pascagoula River basin, channel change literature)

Data collection

- download, compile and edit existing hydrologic data off the Internet and CD-ROMs,
- collect and photocopy historic cross sections and discharge summary data from the USGS in MS

- compile statistics on historic mining in Pascagoula River basin

- compile maps and aerial photographs to evaluate floodplain disturbances

Data input and analysis

- plot and analyze long-term hydrographs

- plot comparison flood cross-sections early and late in the period of record

- analyze aggradation and degradation using various methods

- produce graphs of temporal variations in extraction from mining statistics

Field observation in study area

- examination of bridges with cross-sectional measurements

Data interpretation and analysis

- compare spatial variation and timing of long-term changes in channel cross-sections to disturbances

OBJECTIVES FOR YEAR 2: Evaluate spatial and temporal character of floodplain disturbances and channel planform changes in a GIS, and compare spatial variations and timing of long-term changes in channel planform character to floodplain disturbances and significant hydrogeomorphic events

TASKS

Data input and analysis

- digitize channel positions of selected portions of the Pascagoula River floodplain as areal features

- digitize channel centerlines of this area as line features

- digitize floodplain mining and other disturbance features as either areal and point coverages or both

- transform data to common projection to analyze changes in areas and lengths of target

features

Preliminary field observation

-canoe length of river to be digitized to obtain ground knowledge of study area

Data interpretation and analysis

-transfer and integrate data into spreadsheets to compile variables by reach blocks of various sizes

-relate various measures of channel instability (areal and linear changes between time periods) to various floodplain disturbances (measured quantitatively) using appropriate statistics

OBJECTIVES FOR YEAR 3: Measure and analyze cross-sectional data in the field, comparing disturbed and undisturbed portions of the Pascagoula River floodplain. Also, synthesize findings of historic cross-sections, GIS analysis, and field measurements.

TASKS

Measurement and analysis of field cross sections

-Measure several cross sections, comparing disturbed and undisturbed portions of the floodplain

-Input, plot and analyze field cross sections in spreadsheets

-Extract various numerical measures from these plots

-Evaluate similarities and differences of cross-sectional measurements of disturbed and undisturbed portions of the floodplain statistically

Synthesis of various project elements

11. **PROGRESS STATEMENT** (maximum 4000 characters):

We are continuing two phases of the project concurrently, the historic changes in channel cross sections and literature review (deliverables due end of year 1) and the GIS/channel planform changes (deliverables due end of year 2). The work for Year 1 involves input and analysis of data collected at the USGS in Pearl, Mississippi during summer 2002. Year 2 research involves work with historic maps and takes a lot of computer and student time, the latter limited and constrained by their class schedules and for that reason, we have begun these tasks as well. The progress on GIS tasks will be faster during summertime, when such constraints are more limited. Despite the birth of twins to the principal investigator in early October, we continued to make progress towards the project objectives.

During the last progress report, we described that we had obtained USGS data, the first being summaries of cross-sectional measurements downloaded from their website. For three of the twelve stations, most of the data records were not yet available on-line (Chickashawhay River at Enterprise, Chickashawhay River at Leakesville, and Pascagoula River at Merrill), so the paper forms were photocopied from the office in Pearl so that data could be input back at UF. For these three stations, about 400-500 additional measurements were input during this reporting period with corresponding variables including date, width, area, velocity, gage height, discharge, and measurement type (e.g. wading, boat, bridge crane). These measurements and others were also corrected for obvious outliers and errors. Also, at the USGS office during the summer visit, maximum depths were recorded from several cross-sectional measurements for each station, focusing on measurements collected at the bridge. During this reporting period, the maximum depths were input into the spreadsheets for the twelve stations and thalweg elevations were computed by subtracting maximum depths from adjusted gage heights.

Historic changes in the datum were also recorded and used to make adjustments to gage height where appropriate. During the spring reporting period, we expect to have some analyses performed to better evaluate which continuous stations, if any, show aggradation or degradation at bridge sites.

Also during this reporting period, cross sections from these twelve continuous stations and a few other stations with partial data were selected. A large subset of the data photocopied this summer is being input. We are beginning to input distance and depth data from cross sections at six stations on the Leaf River, four of them continuous (Collins, Hattiesburg, McLain, New Augusta) and two partial (Taylorsville, Raleigh). For each station, a measurement at the bridge (preferably the same side throughout the entire period of record) about every ten years has been selected to evaluate long-term changes in cross-sectional form, such as aggradation or degradation, narrowing or widening. During the spring reporting period, we expect to have all continuous and partial stations input and historic cross sections plotted .

In addition, there has been progress on literature review. We have researched United States Senate and House of Representatives documents (from 1824 to the present) to chronicle influences and modifications to the natural flow regime including use as a navigable waterway. We have copied and reviewed original documents, microfilm, microfiche, and microprint data including maps. We have collected and copied historical accounts of the Pascagoula River basin about early exploration and settlement, development of the natural resources, channelization and other modifications of the natural drainage within the basin. We have also identified and copied some scientific and engineering reports from government agencies and private consultants concerning the soils, geology, hydrogeology, drainage, harbor development, and other topics.

We are continuing to acquire relevant secondary data. One of our contacts (Greg Duke, Deputy Director, Sales and Use Tax Bureau, Office of Revenue) has records for gross tax collections related to sand and gravel production. These records are statewide and do not provide information by county or mine site. We have requested them early in the fall and sent a reminder of our interest in having these data. We are continuing to inquire whether other sources with more detailed information are available.

The progress on GIS tasks continues, albeit at a slower pace than the summer reporting period. During this (the fall) reporting period, four historic 15-minute series USGS quads (Wiggins, Beaumont, Enterprise and New Augusta) were registered. We tested prediction and RMSE errors for normality and created confidence intervals about the prediction errors such that the errors are within National Map Accuracy Standards. All of the registration errors were within 10m, well within the NMAS tolerances. Channel banks on the Leaf River were digitized for the Louin SW, Center Ridge, and Taylorsville quads over the 1995-96 DOQQs. These are the quads that contain highways 18, 28 and 84, areas of change that are of interest to funding agencies. These will be compared to the 1980's series DRGs and graphics of channel changes between these period are currently being made using GIS software. We continue to back up our files, in case of possible computer problems, and have found this helpful in multiple instances.

Of some concern is the fact that we have not yet received the second increment of funding required to complete the tasks for Year 1. This funding was due in October or November and will be necessary to complete deliverables in a timely manner, as it will

not be possible to hire additional students or continue to employ current students should funds be exhausted in that category. Now that the principal investigator is back on campus regularly, we hope that the funding will arrive shortly, so that there will not be major delays in the completion of tasks and so that students will not have problems maintaining employment. In sum, we have had made further progress of different types towards deliverables and project tasks for Years 1 and 2.

12. PROJECT SUMMARY STATEMENT (one or two hardhitting sentences that capture project merits):

This study will examine and quantify relationships between floodplain disturbance and channel changes in the Pascagoula River basin. It is important because channel instability has numerous ramifications to the environment and private and public properties, thus results can be used for defining and refining state regulations regarding floodplain activities, including those of the mining industry.

13. KEYWORDS (at least 1; up to 8): fluvial geomorphology, river instability, channel changes, land use, mining, floodplains, Pascagoula River, Mississippi
14. PUBLICATIONS (Cite all publications resulting from project including proceedings and technical reports. Use Journal of Wildlife Management style. Also, submit 5 reprints):
None
15. PRESENTATION CITATIONS (Use Journal of Wildlife Management style, to include Name, Year, Title, Meeting/Conference Name, City and State: None
16. THESES/DISSERTATIONS CITATIONS (Use Journal of Wildlife Management style. Also, submit 2 copies):
None
17. EMPLOYMENT STATUS OF GRADUATED STUDENTS (Provide Position Title, Agency/Company Name, City and State of employment of any graduated MS or PhD students who graduated): None graduated
18. HONORS/AWARDS: None
19. PERSONNEL:

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Joann Mossa	Assoc. Professor		F	No
	Geography/Integrated			
David Coley	MS Grad Student		M	No
	Geography/Integrated			
Glenn Hermansen	MS Grad Student		M	No
	Geography/Integrated			
Justin Ahern	Undergrad Student	M		No
	Geography/Integrated			

X MS Grad student; PhD grad student; Post-doc; Biologist; Technician;....

** B=Black; H=Hispanic; I=American Indian; O=Other; A=Alien

*** Aquatic, Terrestrial, or Integrated

20. NEWS MEDIA INVOLVEMENT:

None