

Fort George Inlet Working Group

Date: August 28, 2015
Time: 10 am – 12 pm
Location: Ribault Club, 11241 Fort George Rd
Hosts: National Park Service and Florida Park Service

Meeting Notes

Welcome and Introductions (Attendance list attached)

Kudos to Michelle and her staff for providing the great accommodations for our meeting!

Shauna presented background on the Inlet Issue (Slides Attached)

- NPS provided presentation on the historical overview of the visual changes we have recorded in the inlet based on imagery and photo-points collected since 2000.

Kevin Hodgens with USACE Presentation (Slides attached)

- Under WRDA 2007 the Corps was authorized to conduct a reconnaissance study to look at sediment management in the Fort George River. This authority did not come with funding authorization.
- The CAP authority under Section 1135 allows the USACE Division level to approve a study. This authority requires a non-federal sponsor to initiate the study (100% Fed cost for the study). The authority has a \$10 mil cap and cost sharing at 75% Fed/25% non-Fed to implement the recommendations of the study.
- The Corps updated the Taylor Engineering Study done previously and considered leveraging ideas for beach re-nourishment and alternative dredging scenarios.
- Based on the 1970's study by UF the tidal prism of the inlet has been significantly reduced with the flood tide being much larger than the ebb tide leading to an increase in sediment deposited within the river.
- The modeled alternatives focused on moving sediment from the outer shoals. Alternative 3 included a trapezoidal cut between the 5 meter to 1 meter depth and a channel cut across the tip of Huguenot. This resulted in an increased tidal efficiency within the inlet of 36%.
- Reference the attached slides for details on the alternatives.

Discussion

Concerns for taking action and not taking action identified by participants included:

- Shorebird habitat
- kite-boarders
- public safety in the water
- sustainability
- overall ecosystem impacts
- water quality

- fisheries
- recreational power-boating
- personal water craft
- paddle boats
- Oyster beds
- Salt marsh and wetlands

Potential recipients of dredge material for beneficial could include existing shore protection projects between Amelia Island and the Beaches.

Potential non-federal sponsors could include recipients of the material for shoreline protection projects.

The cost for harvesting this material is higher than the off-shore deposits currently used. The higher cost is primarily associated with transportation of the materials due to the jettys. The cost would be borne by the non-federal sponsor.

Action Items:

1. All - Identify issues and concerns and available data on resources potentially affected by the changes in the hydrology of the Fort George River.
2. COJ/SJRWMD/DEP – Determine interest participation as non-federal sponsor
3. Shauna - Reconvene this group in 2 months for further discussion. ([Link to doodle poll](#))

Thanks to everyone who came and participated! This was a great opportunity for some of our newer partners to engage and bring different perspectives to the table. We look forward to continued dialogue and focus on the inlet and the resources and activities it provides to the Preserve.

Background information from NPS

11302009.Bryant et.al. Fort George Photo Documentation.pdf (Fort George River Sediment Deposition Photo Documentation)

12182009.USACE Sediment Management at Fort George Inlet.pdf (USACE Committee on Tidal Hydraulics Review)

10232012.fort george task force.doc (Meeting notes)

Meeting presentations

fort george river presentation_small.pdf(2011 update to the 2009 photo documentation)

Ft George Inlet mgmt 08282015.pdf (USACE presentation)

EBB SHOAL DREDGING ALTERNATIVES AT FORT GEORGE INLET, FL_coastalsediment....pdf (Hodgens paper)

FS_Non-federalSponsor.pdf (Non-Federal Sponsorship information brief)

08282015.attendance.docx (meeting attendance)

Jackson, John

From: Gary Anderson <hawki88@comcast.net>
Sent: Saturday, September 05, 2015 10:35 AM
To: Jackson, John
Cc: Crescimbeni, John
Subject: FW: Fort George Inlet Task Force
Attachments: 08282015.attendance.docx; 08282015.notes.docx; EBB SHOAL DREDGING ALTERNATIVES AT FORT GEORGE INLET, FL_coastalsediment....pdf; FS_Non-federalSponsor.pdf; Ft George Inlet mgmt 08282015.pdf; 10232012.fort george task force.doc; 12182009.USACE Sediment Management at Fort George Inlet(2).pdf; 11302009.Bryant et.al. Fort George Photo Documentation(2).pdf; fort george river presentation_small.pdf

Mr. Jackson: I would like this email and attachments become part of the file on the Waterways discussions about Ft. George Inlet Management Plan(s). I attended the 8-28-15 meeting at the Ribault Club as a member of the Waterways Commission. I have suggested in a separate email to Councilman Crescimbeni that the Meeting Notes be made available to the public and members of the next Waterways Commission meeting. If you have questions or need additional information, please contact me at your convenience.

Gary Anderson
12644 Hidden Circle w.
32225
Hawki88@comcast.net
904-322-2397 c

From: Allen, Shauna [mailto:shauna_allen@nps.gov]
Sent: Friday, September 04, 2015 5:49 PM
To: Shauna Allen; Victor Teng; Fish Hawk; Harrah, Jason S SAJ; Schrader, Matthew H SAJ; eguthrie@northfloridalandtrust.org; Conboy, Allison; Harris, Meghan M.; Denesia Cheek; Dan Pearson; Craig.parenteau@dep.state.fl.us; Cicely Pontiflet; Clifton.maxwell@dep.state.fl.us; Waterman, Michelle; Chriswin@coj.net; sbeville@coj.net; Geoffrey Sample (GSample@sjrwmd.com); Kelso, Kathleen; Richard.rachal@dep.state.fl.us; Noel, Andrea; Hodgens, Kevin C SAJ; Engle, Jason A SAJ; Quinton White
Cc: Mark Middlebrook; Chris Hughes; Jim Maher; Marc Hudson; Paul Haydt; Mark Ford; Catherine Toline; Maria Mark; Brian Burket; Linda York
Subject: Re: Fort George Inlet Task Force

Greetings on this Friday before Labor Day!

I really hope that I am the only one working at this hour just to make sure I got these notes off of my desk and into your inbox before the week was out.

Thanks for participating in the meeting last week. The discussion was informative and engaging. This effort has been moving slowly over the past several years, but over that time we saw the fruits of the modeling labor and have answers to some questions and as a result more questions to answer. My hope is that we continue to keep open dialogue and ultimately build consensus around a desired outcome whether that involve manipulation of the system or increased monitoring to assess the impacts of the ongoing changes or something else entirely.

I have included a bunch of attachments. The meeting notes list each one and hopefully the order that helps bring folks up to speed and address a few of the questions asked at the meeting. the USACE presentation and Kevin's paper are also included.

Cheers to a great weekend and shouts out to St. Augustine for the 450 Celebration!

Shauna Ray Allen
Chief of Resource Stewardship and Partnerships
Timucuan Ecological and Historic Preserve and
Fort Caroline National Memorial

National Park Service
13165 Mt. Pleasant Rd
Jacksonville, FL 32225

(904) 221-7567 x115 Office
(904) 545-7709 Mobile
(904) 221-5248 Fax
shauna_allen@nps.gov
www.nps.gov/timu



On Tue, Aug 18, 2015 at 5:48 PM, Allen, Shauna <shauna_allen@nps.gov> wrote:
Greetings Everyone,

We are reconvening to hear from the USACE about their study to evaluate the potential for beneficial use of dredged sand from the Fort George Inlet for the Duval County Shore Protection Project.

The meeting will be held at the Ribault Club on August 28 from 10 am until 12 pm.

Many thanks to our partners at the FPS for lending us the great facilities!

The draft Agenda is as follows:

Introductions
Background on the Inlet Issue
USACE Presentation
Discussion

I look forward to seeing you or your representative there.

Shauna Ray Allen
Chief of Resource Stewardship and Partnerships
Timucuan Ecological and Historic Preserve and
Fort Caroline National Memorial

National Park Service
13165 Mt. Pleasant Rd
Jacksonville, FL 32225

(904) 221-7567 x115 Office

Florida Inland Navigation District 2015
3rd QTR Update

Project Name	Project Description	Grantor Award	COJ Match	Total Award	Status
FIND FY2012 Grants					
Mayport Docks.	Construction of additional docks	\$401,675	\$401,675	\$803,530	Project complete.
Pottsburg Creek	Design and permitting of dredge	\$125,000	\$125,000	\$250,000	Project complete.
FIND FY2013 Grants					
Exchange Island	Design/permit of small boat dock, shoreline kayak area, hiking trail, pavilions with tables and grills	\$52,380	\$63,380	\$115,760	Project complete.
Sisters ICW Dock Redesign	Design/permit for relocating pilings and docks	\$33,380	\$37,380	\$70,760	Permit received. Design being finalized.
Ortega Channel Markings	Install channel markers	\$14,300	\$19,300	\$33,600	Project complete.
County Road Boat Ramp	Design/permit new boat ramp for hand launch boats; remove pilings	\$41,760	\$50,760	\$92,520	Design complete. Waiting on permit.
Northbank Riverwalk Bridge	Design/permit to remove bridge and reroute Riverwalk; add kayak launch	\$36,000	\$44,000	\$80,000	Permit received. Design being finalized.
Northshore kayak launch	Design/permit kayak launch area with ADA access	\$26,100	\$32,600	\$58,700	Design at 60%. Waiting on permits.
continuation of Blue Cypress boardwalk	Design/permit boardwalk extension to connect to Arlington Lions Club	\$36,420	\$44,420	\$80,840	Project complete.
Lighting at ICW Boat Ramp	Install lights at ICW BR around ramp and associated parking area	\$67,750	\$74,250	\$142,000	Design complete. Construction in progress.
Lighting at Sisters Creek Boat Ramp	Install lights at Sisters Creek BR around ramp and associated parking area	\$69,680	\$76,180	\$145,860	Design complete. Construction going out to bid soon.

Florida Inland Navigation District 2015
3rd QTR Update

FINID	FY 2013 Grants continued	Grantor Award	COJ Match	Total Award	Status
	Charles Reese BR - Dock launch	\$40,500	\$48,000	\$88,500	Design at 60%. Waiting for permits.
	Half Moon Island Boat Ramp	\$22,475	\$27,725	\$50,200	Design at 60%. Permit received.
	Half Moon Island Park Development	\$42,475	\$47,725	\$90,200	Design at 60%. Permit received.
	Fishing Creek Dredging	\$209,250	\$240,750	\$450,000	Dredging underway.
FINID FY 2014 Grants					
	Exchange Club Island	\$113,250	\$135,900	\$249,150	Going out to bid soon.
	Northbank Riverwalk	\$71,400	\$85,680	\$157,080	Waiting on final design.
	Blue Cypress boardwalk extension	\$105,750	\$126,900	\$232,650	Project being awarded.

EVALUATION OF EBB SHOAL DREDGING ALTERNATIVES AT FORT GEORGE INLET, FL

KEVIN C. HODGENS¹

1. *U.S. Army Corps of Engineers, Jacksonville District, 701 San Marco Blvd., Jacksonville FL, 32207, USA. kevin.c.hodgens@usace.army.mil.*

Abstract: The construction and maintenance of the St. Johns River (SJR) inlet north jetty and navigation channel has resulted in accumulation of littoral sediments causing migration of the Fort George River (FGR) inlet and the prevention of bypassing material to southern beaches. Three FGR inlet ebb shoal dredging scenarios were evaluated with the Coastal Modeling System (CMS) to determine if erosion to an adjacent shoreline could be halted or reversed while restoring FGR inlet efficiency and providing a sediment source for erosional beaches south of the SJR. The CMS model results for each dredging scenario were compared to the baseline condition with respect to changes to current velocity, tidal prism, sediment transport, morphology change, and wave energy density.

Introduction

The FGR inlet system is located 1.3 miles north of the SJR inlet and 20 miles south of the Florida-Georgia border (Fig. 1). The unstructured and unmaintained inlet is surrounded by city, state, and national parkland that provide important ecological value and recreational opportunities. Southern portions of the study area are protected by the 1982 Coastal Resource Barrier Act (CBRA, Public Law 97-348) which prevents expenditure of Federal dollars for addition or removal of sand via dredging. Northward migration of the inlet following construction of the SJR inlet north jetty and subsequent lengthening and sand tightening of the structure has resulted in land and infrastructure losses, threatened State Road A1A (SR A1A; a hurricane evacuation route), and generated concerns of future damages from local stakeholders.

In 1934 a concrete cap was constructed on the SJR north jetty, effectively stopping the southward flow of sediments and creating the spit now known as Wards Bank. As Wards Bank expanded northward, the FGR entrance channel moved northward, which eroded southern portions of Little Talbot Island (LTI). By 1978, the SR A1A bridge and eastern approach was threatened by the ongoing erosion and northward migration of the FGR inlet prompting construction of a riprap revetment to protect the SR A1A roadway. The revetment halted the northward migration of the FGR inlet in the vicinity of the roadway, but southeastern LTI remained unprotected and continued to

experience erosion as the inlet continued migrating north. This resulted in an elongated inlet channel with reduced hydraulic efficiency and created a flood dominated system that impounds sediment.

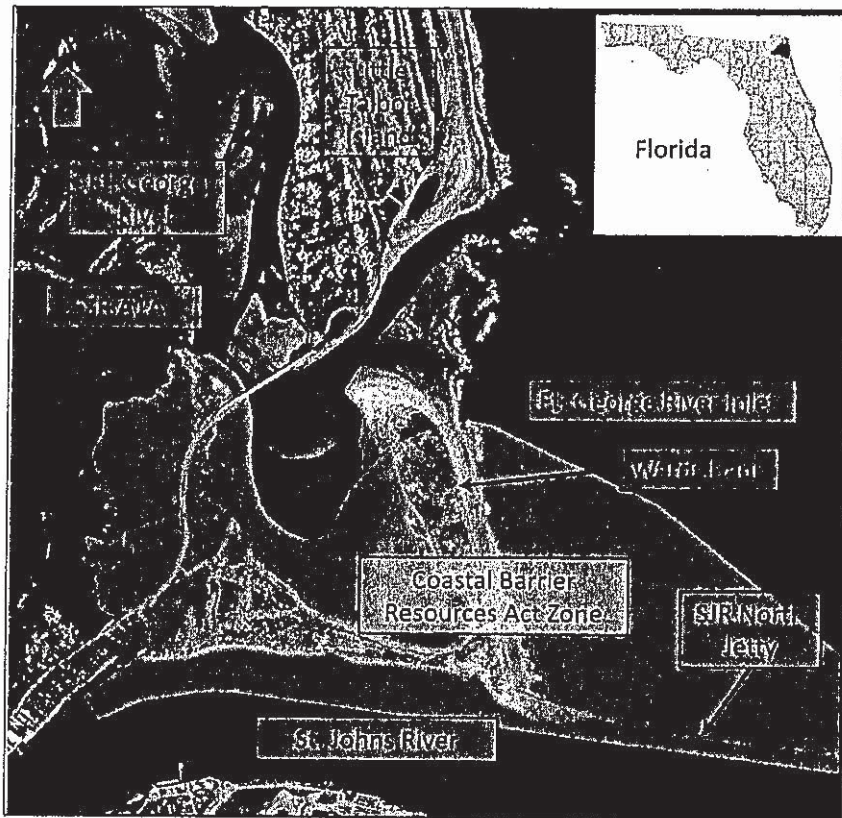


Fig. 1. Fort George River inlet study area.

The SJR jetties and deep navigation channel prevent bypassing of material to the beaches south of the inlet contributing to the erosion observed on the beaches of Duval County. Sediment bypassing around the SJR inlet was outlined as a regional sediment management (RSM) strategy for the area in USACE (2000) and FDEP (2008). The present study investigates three dredging scenarios proposed for the FGR inlet ebb shoal that could provide varying amounts of

sediment to the Duval County Federal Shore Protection Project (DCSPP). Dredging the FGR inlet would have three goals: reduce the erosion to LTI; restore the efficiency of the FGR inlet system, and provide a sediment source for the DCSPP.

Model Setup

Dredging alternatives developed for this study were evaluated using the Coastal Modeling System (CMS) which simulates hydrodynamics and sediment transport in coastal waters (Sanchez et al., 2014). Bathymetry and wave and flow boundary conditions developed during the USACE (2014) study to deepen Jacksonville (JAX) Harbor provided the basis for the setup of the current model. The original CMS Cartesian grid used in the deepening study was updated to a telescoping grid for increased resolution in critical flow areas around the FGR inlet. Additional bathymetry from the FGR inlet area that was not included in the deepening study was added to the model domain.

The CMS Flow model was driven by three boundaries located in the FGR, SJR, and along the open ocean (Fig. 2). The water level and current velocity boundary conditions were interpolated from an ADCIRC grid developed for the JAX Harbor deepening study and included the May 1, 2009 to July 31, 2009 time period (Bacopoulos and Hagen, 2009). The CMS Wave model was unchanged from the deepening study and received boundary condition inputs from a parent grid that transformed offshore wave data collected by NDBC buoy 41012 to the nested boundary.

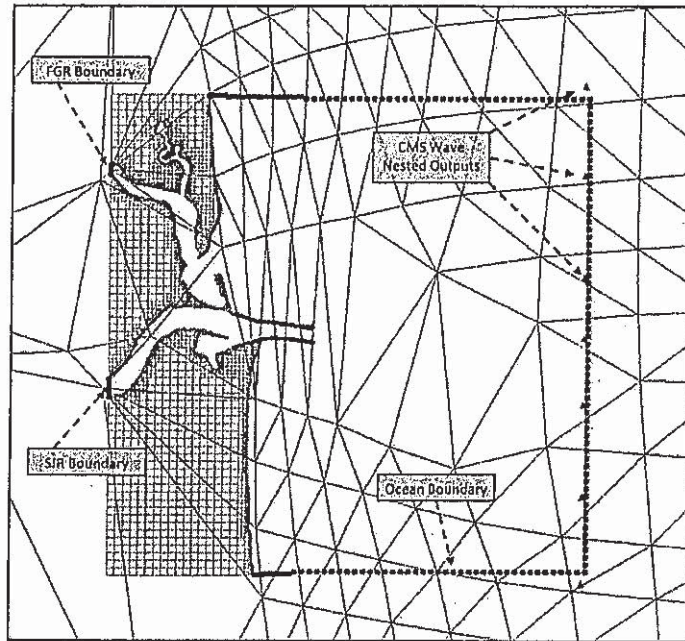


Fig. 2. CMS grid boundaries with ADCIRC mesh.

The baseline model bathymetry was modified to reflect three proposed dredging scenarios to determine whether the cuts would improve the hydraulic efficiency of the inlet and reduce erosion to the LTI shoreline. The first modeled alternative, "contour cut", simulated removal of 474,000 m³ of material from the southern ebb shoal between the 3m- and 5m-depth contours following the shape of the depth contours (Fig. 3). The contour cut was anticipated to cause the least amount of disruption to existing inlet conditions since its size and shape would not drastically alter incoming waves or existing current patterns.

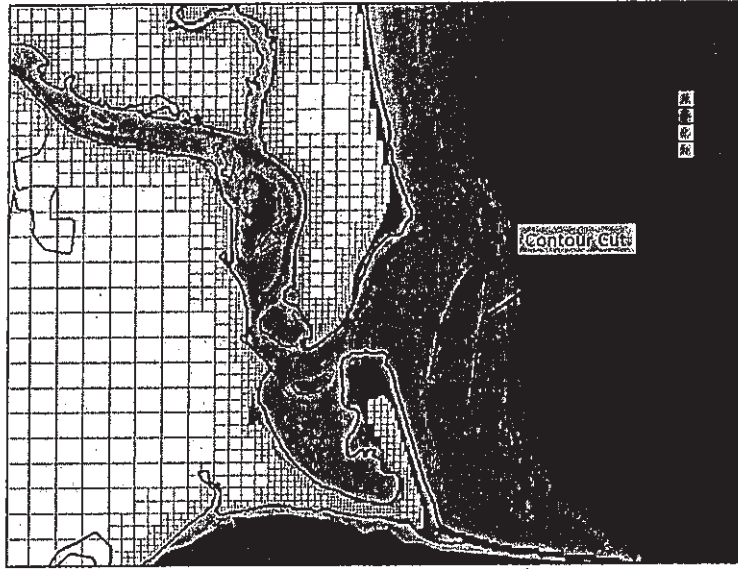


Fig. 3. Contour cut dredging alternative

The “trapezoidal cut” model alternative was developed with the idea that wave energy would be focused towards the existing marginal flood channel with an expectation that erosion would deepen the channel and encourage increased flow through the channel. The trapezoidal cut starts at the 5m-depth contour and extends into the 1m-depth contour at its landward extent, representing removal of 810,000 m³ of material (Fig. 4). The final alternative included the addition of a 5m-deep and 80m-wide channel through the northern tip of Wards Bank to the trapezoidal cut, which represented removal of an additional 352,000 m³ of material. The premise for adding the channel was to directly intervene with existing conditions and provide a new pathway for tidal flow in case channel relocation did not occur from the trapezoidal cut alone.

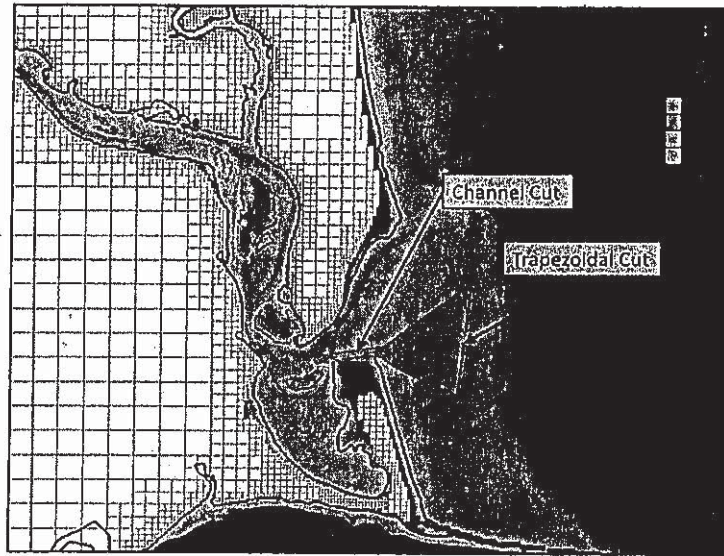


Fig. 4. Trapezoidal cut and additional channel cut dredging alternatives.

Calibration

Comparisons of water surface elevation between the baseline model condition and field measurements were performed for locations including: the FGR, SJR, and offshore Little Talbot Island, again leveraging previous work associated with the JAX Harbor deepening study. The correlation coefficient (R^2) calculated for these stations equaled 0.83, 0.92, and 0.90, respectively. Since the location of the FGR station was directly adjacent to the CMS Flow boundary and ADCIRC model output point, adjustments to the default model setup parameters was not expected to improve the correlation so no changes were made. Wave height comparisons were possible using data from an ADCP collocated offshore of LTI with the water level gage in 6.2 m water depth. The wave height time series matched the general trend ($R^2 = 0.81$) with some deviations in height and timing of the waves during the second half of the model period. Finally, tidal prism volumes during spring flood and ebb tides were calculated from the model results and compared to published measured values. The calculated flood and ebb tidal prism equaled 86% and 64% of the values measured by Kojima and Mehta (1978), respectively, which was deemed acceptable due to the decrease in hydraulic efficiency and dominance of the flood tide documented in Gosselin, et al. (2002).

Results

Dredging alternatives were compared to the baseline model simulation over the May to August 2009 time period to determine changes to currents and tidal prism, sediment transport and morphology evolution, and wave energy density. Residual sediment transport (RST), calculated as the cumulative sum of the sediment transport for the x- and y-directions, provides insight into the dominant transport direction over the simulation period. The change in RST over a given model grid cell or morphologic feature results in morphology change (Fig. 5). Wave energy density comparisons through time were performed via a corollary to Equation 1 (USACE, 1984) by cumulative sum of the wave height squared then directly compared to the baseline condition (i.e. dredging alternative / baseline).

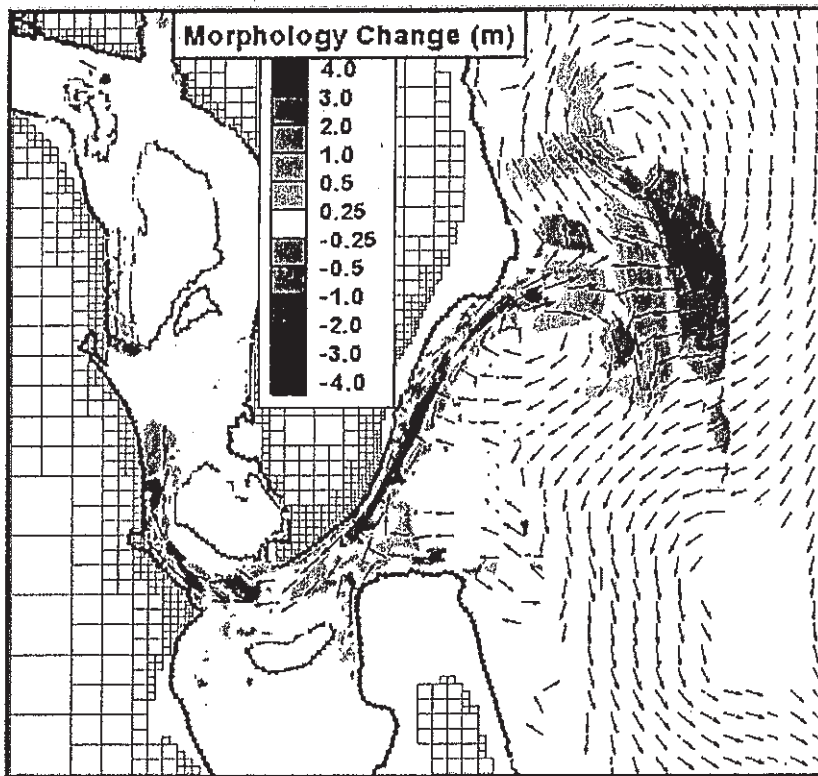


Fig. 5. Morphology change with RST vectors following baseline model simulation.

$$\bar{E} = \frac{1}{8} \rho g H^2 \quad (1)$$

where \bar{E} = energy density; ρ = density of seawater (1025 kg/m³); g = acceleration due to gravity (9.81 m/s²); and H^2 = wave height squared.

Current Velocity and Tidal Prism

The contour and trapezoidal cuts caused no appreciable changes to calculated tidal prism or peak tidal current velocities within the FGR inlet during spring flood and ebb tides. As such, the ratio of flood to ebb tidal prism was unchanged (1.32). The addition of the dredged channel to the trap cut resulted in reduced velocities and tidal prism through the existing inlet channel and increased velocities and tidal prism within the dredged channel (formerly flood marginal channel; Fig. 6). At the SR A1A bridge, tidal prism increased 8% during the spring flood tide and 36% during the spring ebb tide which resulted in the ratio of flood to ebb tidal prism decreasing from 1.32 to 1.06.

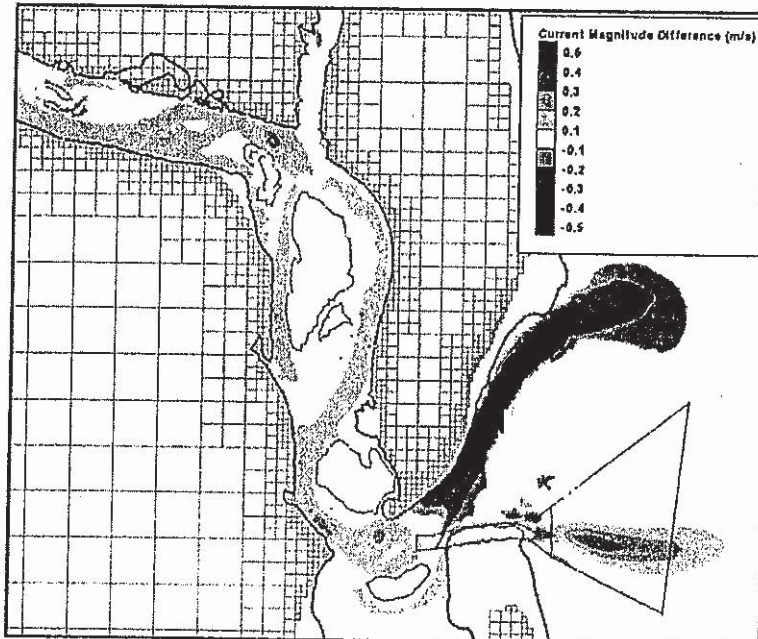


Fig. 6. Current velocity magnitude difference between trapezoidal cut plus channel and baseline model simulations during spring ebb tide.

Sediment Transport and Morphology Change

Changes to RST patterns and morphology evolution for the contour cut model simulation versus the baseline condition were limited to areas in or adjacent to the dredged area. RST changes were most pronounced along the northern, western, and southern edges of the contour cut while morphology changes suggest equilibration of the dredge cut was the only deviation from the baseline simulation. Similarly, morphology change during the trapezoidal cut model simulation largely followed the baseline simulation and deviations between the two simulations were limited to the borrow area with the exception of additional shoaling in the flood marginal channel. Changes to RST were more pronounced for the trapezoidal cut with increased sediment flows directed westward along the dredge cut.

RST patterns generated from the trapezoidal cut plus channel simulation drastically deviated from the baseline condition. The most obvious change is the increase in RST within the dredged channel and extending out beyond the seaward edge of the trapezoidal cut, coupled with the decrease in RST through the existing inlet (Fig. 7). The addition of the dredged channel resulted in reductions to the flood dominated RST along the west bank of the FGR near SR A1A as well as ebb flow-directed sediment transport elsewhere in the FGR.

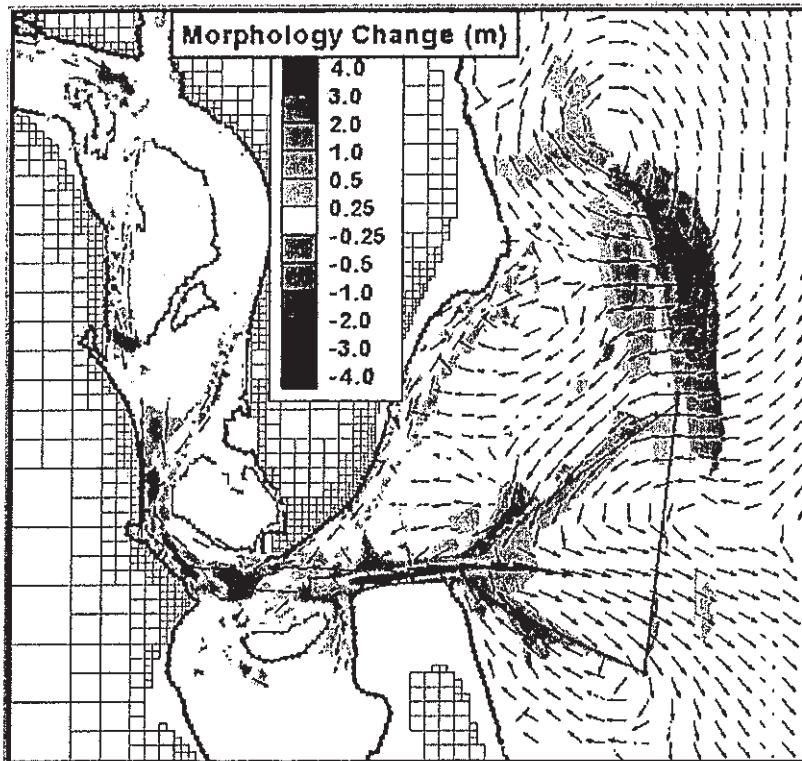


Fig. 7. Morphology change with RST vectors following the trapezoidal cut plus channel model simulation.

Wave Energy Density

For the contour cut, wave energy density changes were only noted within and adjacent to the borrow area and were minor. The trapezoidal cut however resulted in an abrupt change in bathymetry since the 5-m dredge cut extended to the 1-m depth contour. The result was high dissipation of wave energy over a short area which resulted in a 10 percent or more reduction in wave energy propagating into the back bay when compared to the baseline simulation (Fig. 8). The addition of a dredged channel to the trapezoidal cut resulted in three to four times as much wave energy into the back bay as waves were free to travel through the channel (Fig. 9).

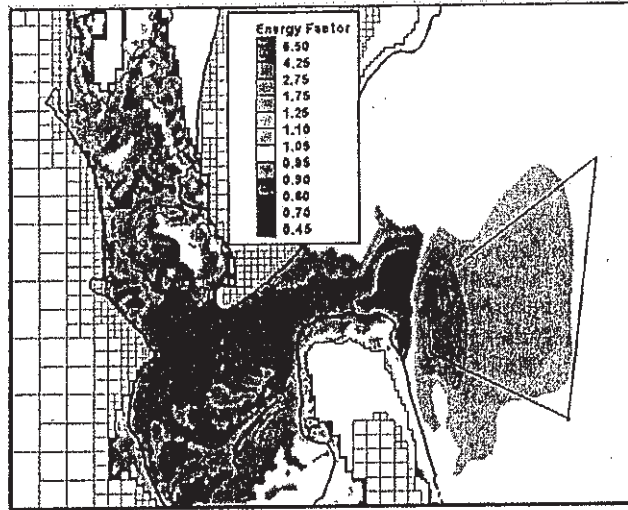


Fig. 8. Cumulative wave energy density corollary comparison for the trapezoidal cut model simulation.

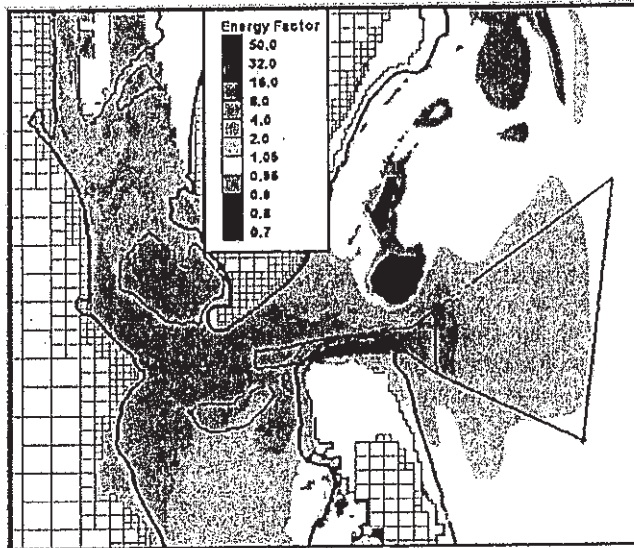


Fig. 9. Cumulative wave energy density corollary comparison for the trapezoidal cut plus channel model simulation.

Conclusion

The modeled dredge cut alternatives resulted in varying degrees of changes to the FGR inlet system, as expected. The contour cut resulted in the least impacts to the baseline inlet condition with changes in velocity, sediment transport, morphology, and wave energy limited to the immediate borrow area with no changes to the tidal prism past the SR A1A bridge.

The trapezoidal cut resulted in similarly limited changes with the exception of greatly reduced wave energy in the lee of the borrow area due to rapid energy dissipation at the westward limit of the trapezoidal cut. These localized changes in the wave field altered sediment transport to a greater degree than the contour cut alternative. The increase in wave energy and dissipation at the landward edge of the trapezoidal cut was not effective in eroding the flood marginal channel as was hoped. Given longer or more energetic model simulation periods, the trend could change, however morphology change suggests that the flood marginal channel actually accreted material during the simulation.

The addition of the dredged channel to the trapezoidal cut alternative reduced the flow through the existing channel and as a result reductions in RST and scour of the channel bed were observed. This leads to the conclusion that erosion to LTI should slow, stop, or possibly even reverse to an accretive trend. The increase in tidal prism increased peak velocities along the west bank of the FGR from 0.84 to 0.88 m/s (5%) during spring flood tide and from 0.60 to 0.78 m/s during spring ebb tide (30%). Coupled with a three to four-fold increase in wave energy, enhanced shore protection could be required along the west bank and the A1A bridge design should be reviewed to ensure the increased scour potential is acceptable.

The trapezoidal cut plus channel alternative also increased the tidal prism, especially during the ebb cycle which is favorable from the standpoint of reducing the impoundment of material in the FGR. The long term change due to the trapezoidal cut plus channel alternative could result in the inlet channel reestablishing to the south at the location of the dredged cut. However once post-project equilibrium of the system occurs, the inlet can be expected to resume its northward migration. Without consistent removal of sediments or structural solutions the erosion problems that are experienced today are expected to return.

Acknowledgements

The author would like to thank Dr. Kelly Legault for sharing her methodologies and knowledge base to analyze this modeling study. Additional thanks go to

Mr. Jason Engle for technical review. Special thanks to Linda Lillycrop, Director of the U.S. Army Corps of Engineers Regional Sediment Management Program, which funded this study.

References

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