



## Assessment and Investigation of the Beach and Dune Conditions at South Padre Island

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# FINAL REPORT #20-265-000-C502

## ASSESSMENT AND INVESTIGATION OF THE BEACH AND DUNE CONDITIONS AT SOUTH PADRE ISLAND

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### Overview:

The City of South Padre Island is home to a dynamic dune system along its coastline. The City saw an increasing need to update its most current beach and dune analysis from 1993. Fortunately, with funding awarded through the Coastal Management Program Cycle 24, the Assessment and Investigation of the Beach and Dune Conditions at South Padre Island were able to begin.

### Task 1: Advertise and Award Contract for Research Services

On August 13th, 2020, the advertisement for the request for proposals was released to the public. Advertisements ran for two consecutive weeks. Submissions were received and opened on September 11th, 2020, at 2:00 pm. The proposals were reviewed initially by the Shoreline Task Force on September 22nd, 2020, then recommended to City Council for the October 21st, 2020 meeting, where the contract was awarded to Integral Consulting. A contract was executed between the City of South Padre Island and Integral and was finalized on November 24th, 2020.



## Public Notice:

### **Request for Proposals for the Assessment and Investigation of the Beach and Dune Conditions at South Padre Island**

The City of South Padre Island is soliciting Statements of Proposals (SOP) until 2:00 pm on Friday, September 11th, 2020 from experienced research organizations to provide services for the assessment and investigation of the beach and dune conditions at South Padre Island. The selected organization will need to perform all necessary tasks including but not limited to surveying, design/engineering, and creating a beach maintenance plan for the City of South Padre Island's shoreline. The RFP packet is available on the City's website at [www.myspi.org](http://www.myspi.org). All inquiries regarding the RFP should be directed to: Kristina Boburka at 956-761-3837 or via email at [kboburka@myspi.org](mailto:kboburka@myspi.org).

## Task 2: Research and Design of Study

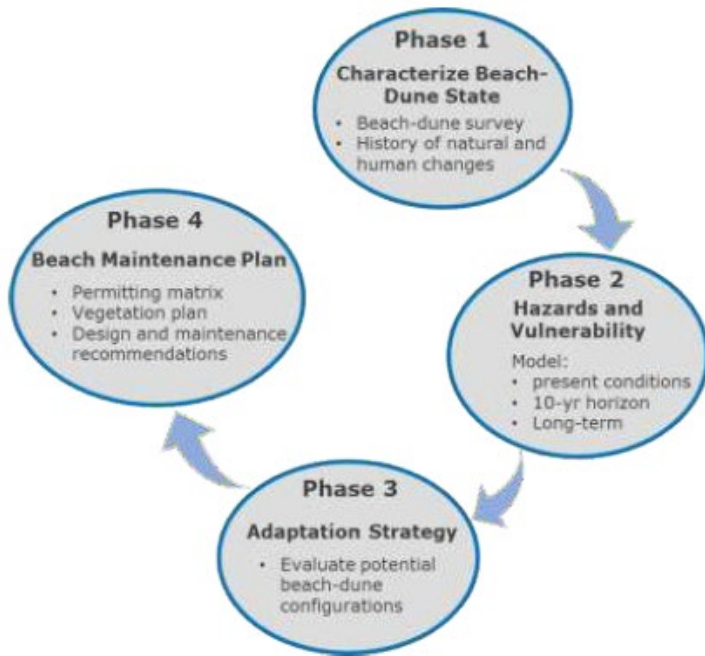


Figure 1. Phases

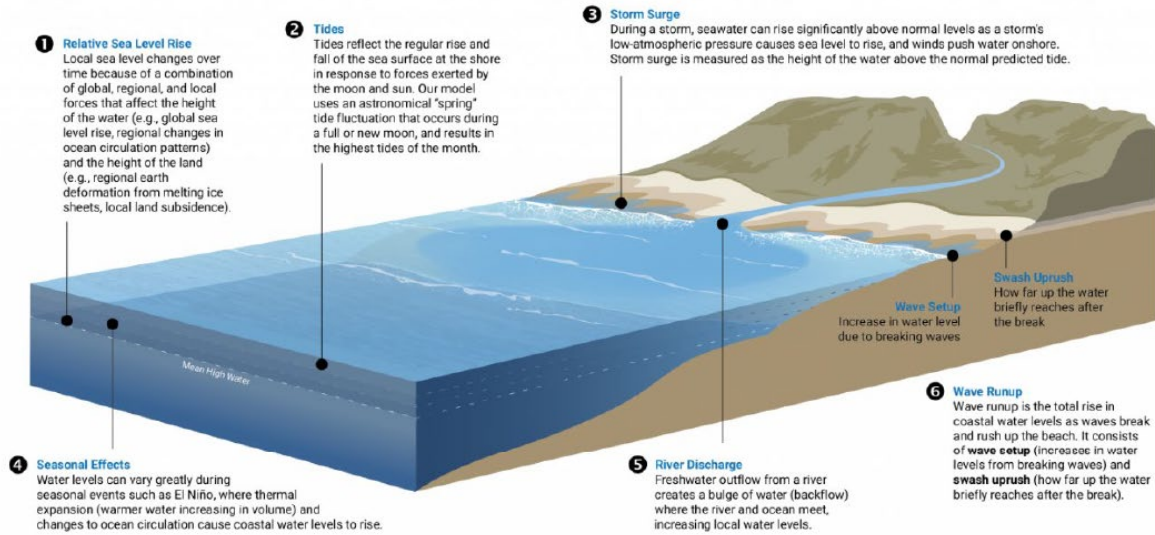
This study is the first of its kind since 1993, and modern technologies and techniques have allowed for a much more robust analysis of the beach and dune system at SPI. The outcomes are intended to help City managers and planners understand the current state of the beaches and dunes and to determine what types of projects and policy changes will need to start being planned now so that SPI can maintain its economically valuable resource that also protects the inland infrastructure. The first phase of the study is an analysis of the current and historical state of the beaches and dunes based on a record of beach profile data going back to 1995, and includes a new survey collected as part of this contract in 2021. Morphometrics, or morphologic features used to analyze changes to the system, were extracted using a semi-automated approach and the results were imported into graphical data viewers that generated statistics of state and change through time.

Integral Consulting Inc. (Integral) was awarded a contract with SPI in 2020 to assess and investigate the beach and dune conditions at SPI. The project was undertaken in phases (Figure 1) following an Integral-developed framework called Coastal ADAPT (Adaptation Decision and Planning Tool) that uses a variety of analysis and modeling approaches to examine adaptation options for increasing resilience to coastal hazards and SLR-related climate change risks. The project also included a Dune Management and Maintenance Plan subcontracted to BIO-WEST.



Figure 2. Location of 25 Analyzed CBI Profiles

**Total Water Level = 1 Relative Sea Level + 2 Tides + 3 Storm Surge + 4 Seasonal Effects + 5 River Discharge + 6 Wave Runup**



**Figure 3. Conceptual Diagram of the Components of Total Water Level. Image courtesy of Our Coast Our Future Web Platform (Point Blue and USGS 2021).**

Coastal processes along SPI that create coastal hazards include tides, waves, and storm conditions. An essential measure of coastal hazards is the total water level (TWL) elevation—the combined effect of wave run-up height, storm surge, tides, and sea-level elevations (Figure 3). River discharge is not a contributing factor to TWL at SPI. A combination of large waves occurring at high tides during storm conditions poses the largest potential to impact coastal erosion. As sea levels rise, wave run-up dynamics and the tide elevations will change, leading to higher total water levels for longer durations.

## Task 3: Project Reporting

### Dune Maintenance and Management Plan

The Dune Maintenance and Management Plan is comprised of four sections. The first section provides a brief regulatory, permitting, and coordination framework to follow. In contrast, the second section discusses the basic information associated with dune establishment, repair, and restoration, highlighting erosion repair activities, planting, fencing, and other important considerations related to dune construction. The third section focuses on management techniques and access issues to protect newly restored areas, and the fourth section concludes with a brief summary and potential recommendations.

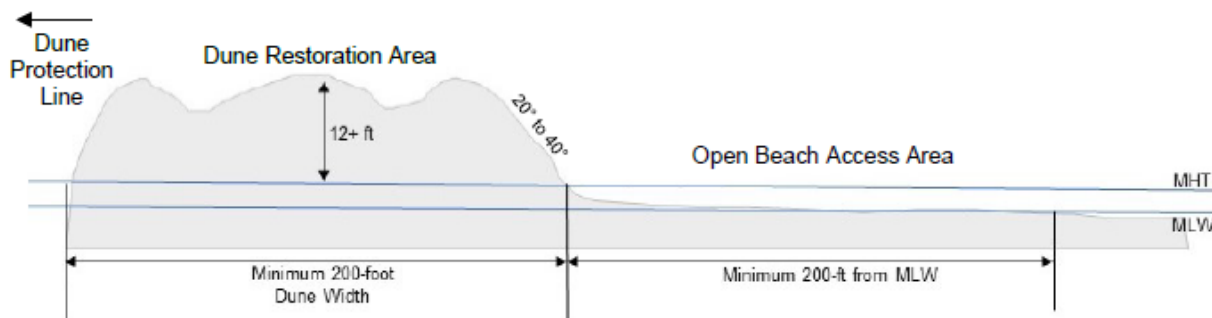


**Image 1: Dunes at South Padre Island**

## Final Recommendations:

Based on coordination with Integral and the Office of Shoreline Management, developing industry standards related to beach and dune restoration, and our professional experience, BIO-WEST recommends the following supplemental actions in addition to the three sections above that would further increase the resiliency of the SPI coastal dune system:

- Reduce the number of permitted walkways, convert walkways to walkovers and combine future walkovers to service multiple properties.
- Limit or restrict the current dune scalping that decreases the dune crest height to 10ft and maintain a minimum dune height of 12ft.
- Implement mandatory re-vegetation requirements for dune restoration applicants through the current city permitting program:
  - Re-vegetation plan with location, methods, and plant list clearly defined
  - Re-vegetation success criteria
  - Yearly monitoring and reporting requirements
- Consider additional city funding, public grants, and/or incentives for volunteer dune restoration activities.
- Consider providing city employee assistance, coordination, and support to potential volunteer dune restoration projects in locating and obtaining non-city funding and grant money.
- Continue existing incentive programs for volunteer planting/re-vegetation programs
- Continue public involvement initiatives, including the beach access handbook and volunteer-led restoration efforts.
- Increase access restrictions to current and future beach restoration and enhancement projects by implementing project protection permitting process, increasing signage and fencing requirements, providing incentive programs for voluntary access restrictions, and engaging compliance officers or local law enforcement.
- Implement a compliance program to identify and remediate any unauthorized paths and trails.
- Consider changes to City ordinances to ensure restoration of dunes removed by property owners.



**Figure 4: Typical Dune Restoration Cross-Section**

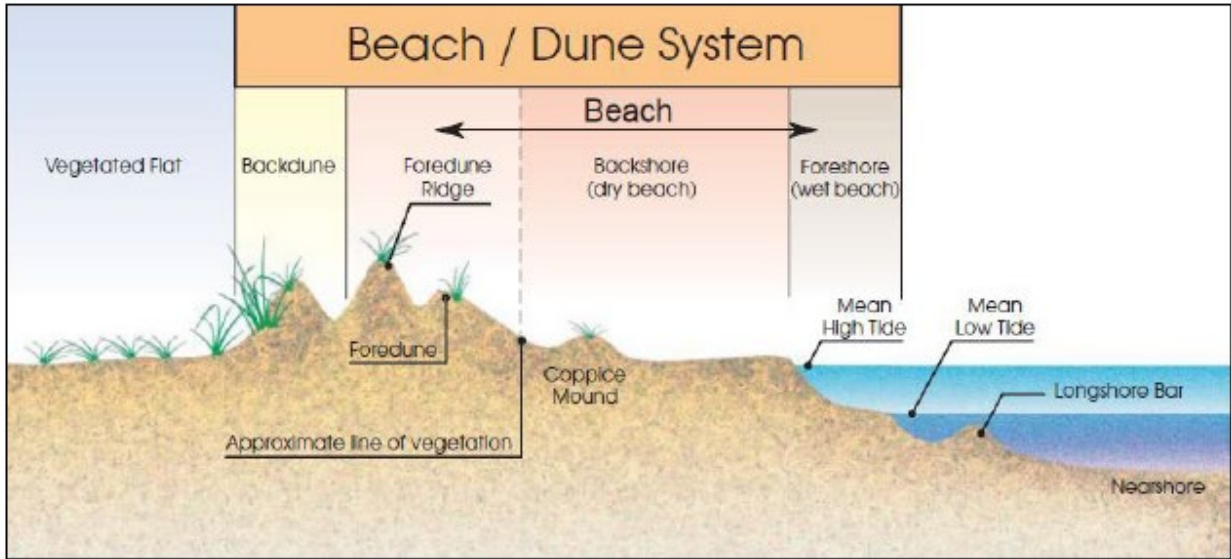


Figure 5: Typical Barrier Island Beach Profile (GLO 2009)

Closeout:

The City of South Padre Island is eager about the in-depth look Integral and Bio-West were able to transpose concerning the island’s dune system. This research will further help maintain South Padre Island beaches and implement unique community ideas for greater coastal protection. The City would like to thank the CMP team for their work alongside the City throughout the entire project, from reporting to ensuring the safety of Texas coastlines. We greatly look forward to working together again soon.

*Erika Hughston*  
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 Erika Hughston, Coastal Coordinator

08.02.2022  
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 Date