MICHAEL P. VICTORINO
Mayor

KARLA H. PETERS
Director

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DEPARTMENT OF PARKS AND RECREATION

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December 9, 2021

Honorable Michael P. Victorino
Mayor, County of Maui
200 South High Street
Wailuku, Hawaii 96793

APPROVED FOR TRANSMITTAL

Michael P Victorino 12/10/21
Mayor Date

For Transmittal to:

Honorable Alice L. Lee, Chair
and Members of the Maui County Council
200 South High Street
Wailuku, Hawaii 96793

Dear Chair Lee and Members:

SUBJECT: BEACH PARKS VULNERABILITY AND ADAPTATION STUDY PHASE I – EXECUTIVE SUMMARY NOVEMBER 2021

Attached is the Department of Parks and Recreation's Beach Parks Vulnerability and Adaptation Study Phase I – Executive Summary November 2021 as prepared by Tetra Tech, Inc.

The vulnerability assessment is part of a long-term strategy to link long-term planning to capital improvement projects. The study provides information that will guide decisions on capital projects in the county's beach parks.

I respectfully request that this matter be referred to the appropriate Council committee for presentation, review and discussion.

Should you have any further questions, please feel free to contact me at Ext. 7385.

Sincerely,

KARLA H. PETERS
Director of Parks and Recreation

Attachment

KHP:lms

COUNTY COMMUNICATION NO. 22-13

County of Maui
Department of Parks and Recreation

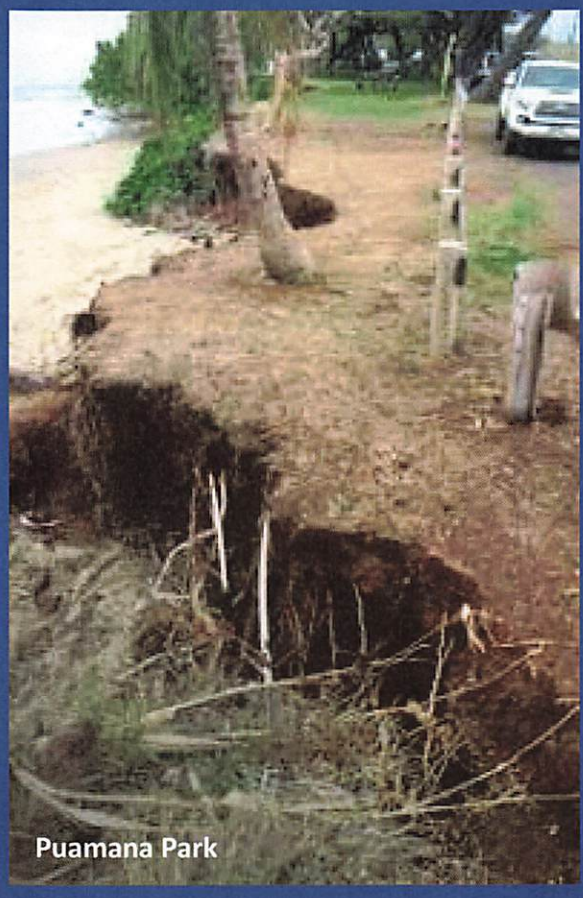
BEACH PARKS VULNERABILITY AND ADAPTATION STUDY

Phase I – Executive Summary

November 2021


Baldwin Beach Park


Ukumehame Beach Park

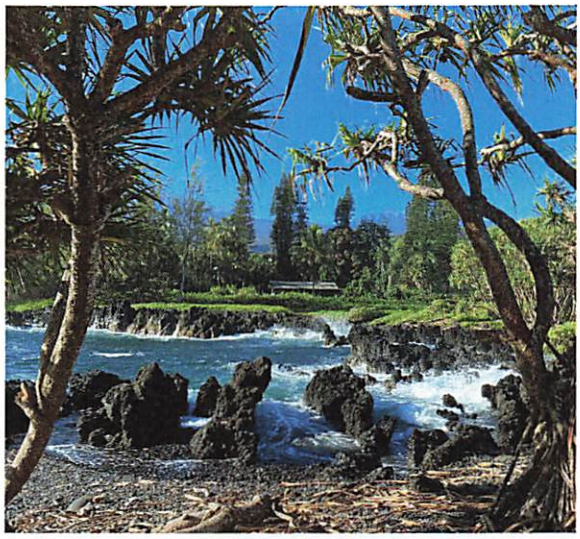

Puamana Park

Prepared by: Tetra Tech, Inc.
737 Bishop Street, Suite 2340
Honolulu, HI 96819

TETRA TECH

Introduction

The County of Maui, Department of Parks and Recreation (DPR) is conducting a study to assess the vulnerability of County beach parks and facilities to flooding and land loss due to sea level rise and other threats and to identify adaptation strategies to address these threats. Many of the Maui County's beach parks have already suffered extensive damage to beaches and park facilities. In some cases, high surf has also uncovered iwi kupuna along the shoreline. The DPR contracted Tetra Tech, Inc. to conduct a vulnerability and adaptation study for 65 Maui County beach parks and the Waiehu Golf Course.

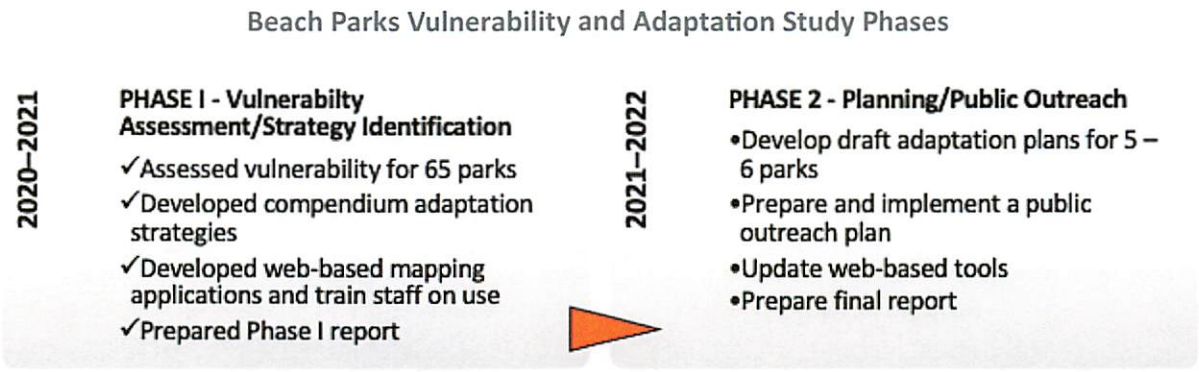


Keanae Park

The study objectives include:

- Assess vulnerability of parks to coastal hazards and sea level rise
- Evaluate the potential for each beach park to adapt to future conditions
- Provide information to help prioritize investments in park infrastructure
- Recommend policies, strategies, and actions to address the short and long-term impacts of climate change

The study is being conducted in two phases (see diagram below). This report provides a summary of the first phase of the work.



Approach

Sixty-five of the 240 County parks were included in the study. These parks include beach parks, regional parks, a golf course, and other parks adjacent to the shoreline. In addition, parking lots associated with these parks, often designated as separate Tax Map Key (TMK) parcels and across the street from a park, were included in the study. The approach was developed through three steps which focused on future condtions, adaptation potenial, and adaptation strategies (see diagram below).

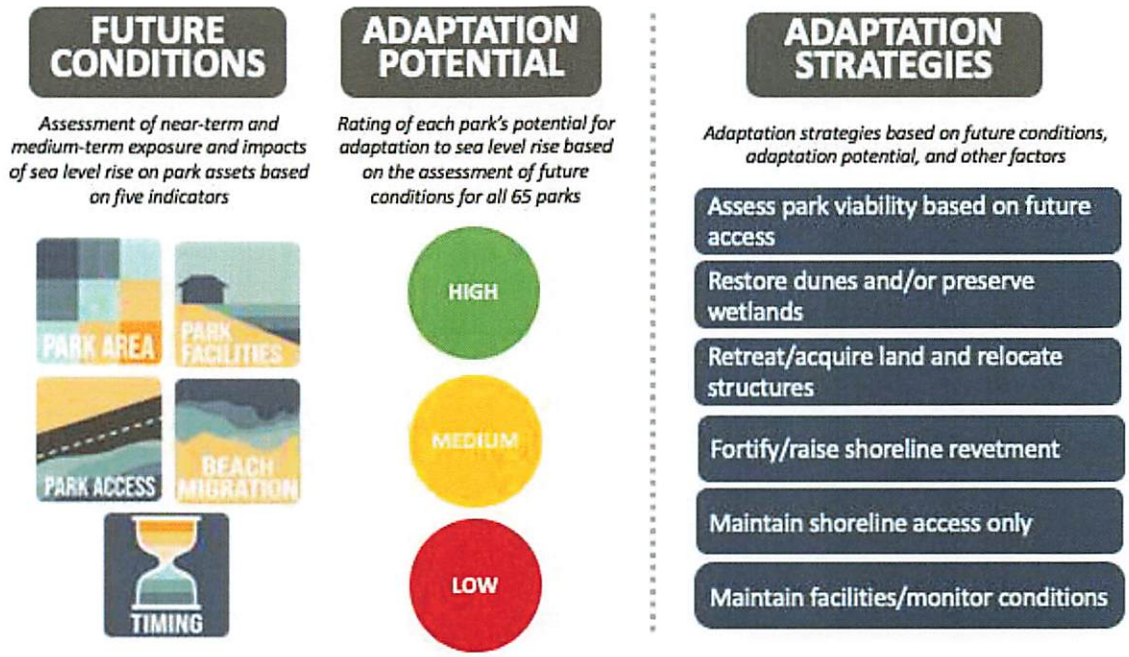
In the first step, **future conditions** were reviewed in terms of five key indicators of vulnerability to sea level rise. These indicators are based on the 2017 State of Hawaii Sea Level Rise Vulnerability and Adaptation Report and associated spatial data provided in the State of Hawaii Sea Level Rise Viewer. Indicators of future chronic coastal flooding and land loss were assessed using the Sea Level Rise Exposure Area (SLRXA) for two scenarios, 2.0 and 3.2 feet.

The SLRXA-2.0 is the projected future condition for approximately 2050 to 2070. The SLRXA-3.2 is the projected future condition for approximately 2070 to 2100.

The **adaptation potential** of each park was rated as *low*, *medium*, or *high* based on the five indicators of future conditions. A park that receives a rating of low adaptation potential indicates that a park is highly vulnerable to sea level rise based on the five indicators and suggests that significant adaptation measures would be required to maintain park viability or may indicate that park viability is in jeopardy.

Six **adaptation strategies** were identified and assigned to each park. Adaptation strategies were assigned to each park considering individual indicators of future conditions, the overall adaptation potential rating, and other factors, such as land use and environmental conditions adjacent to the park.

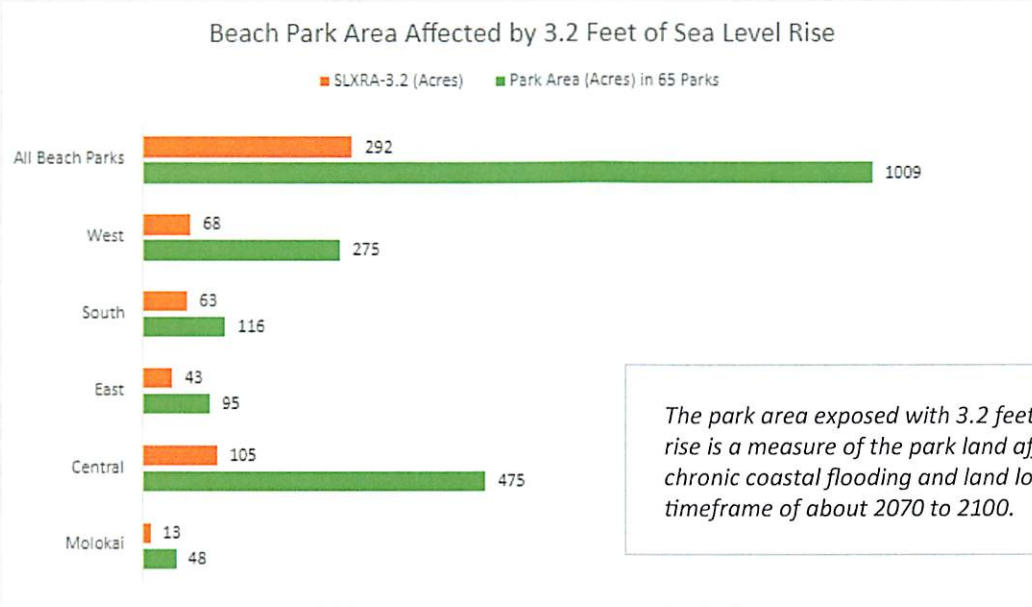
Study Approach



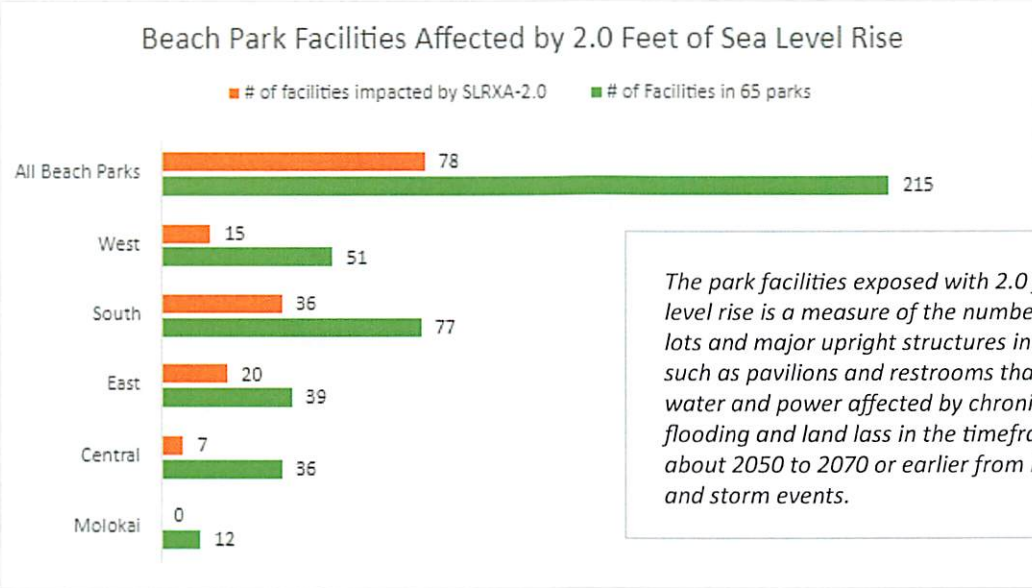
Summary of Results

FUTURE CONDITIONS

All 65 parks in the study will experience long-term shoreline change to due sea level rise, some parks more than others. Seventy-eight park facilities (restrooms, parking lots, picnic shelters, etc.) or 36 percent of facilities in parks included in this study are expected to be exposed to sea level rise within the next 30 years or earlier if high tide and wave events and storm surge impact the shoreline as has occurred at Baldwin Park. Access to most parks on State and County roads will be impaired by sea level rise. Approximately 32 miles of State and County roads will be inundated by sea level rise impairing access to 40 percent of County parks. Finally, flooding and land loss due to sea level rise is likely to occur within the next 30 years for 46 parks or 72 percent of the parks in the study without action.



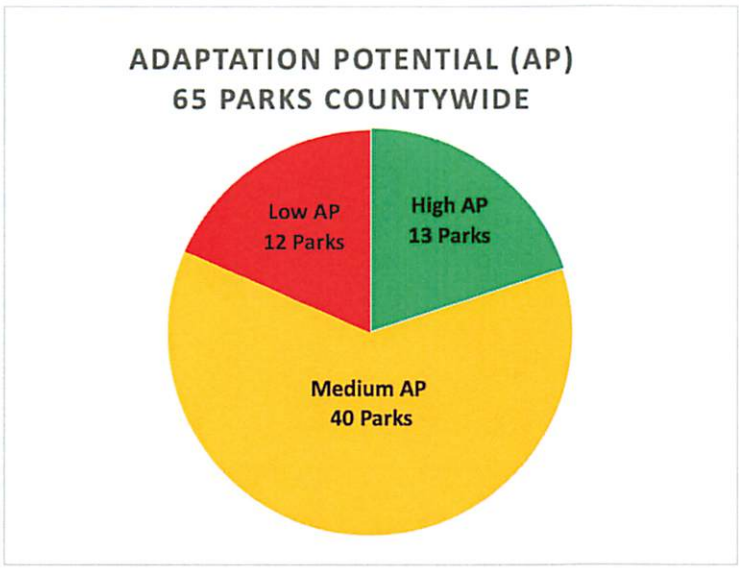
The park area exposed with 3.2 feet of sea level rise is a measure of the park land affected by chronic coastal flooding and land loss in the timeframe of about 2070 to 2100.



The park facilities exposed with 2.0 feet of sea level rise is a measure of the number of parking lots and major upright structures in the park such as pavilions and restrooms that have water and power affected by chronic coastal flooding and land lass in the timeframe of about 2050 to 2070 or earlier from high wave and storm events.

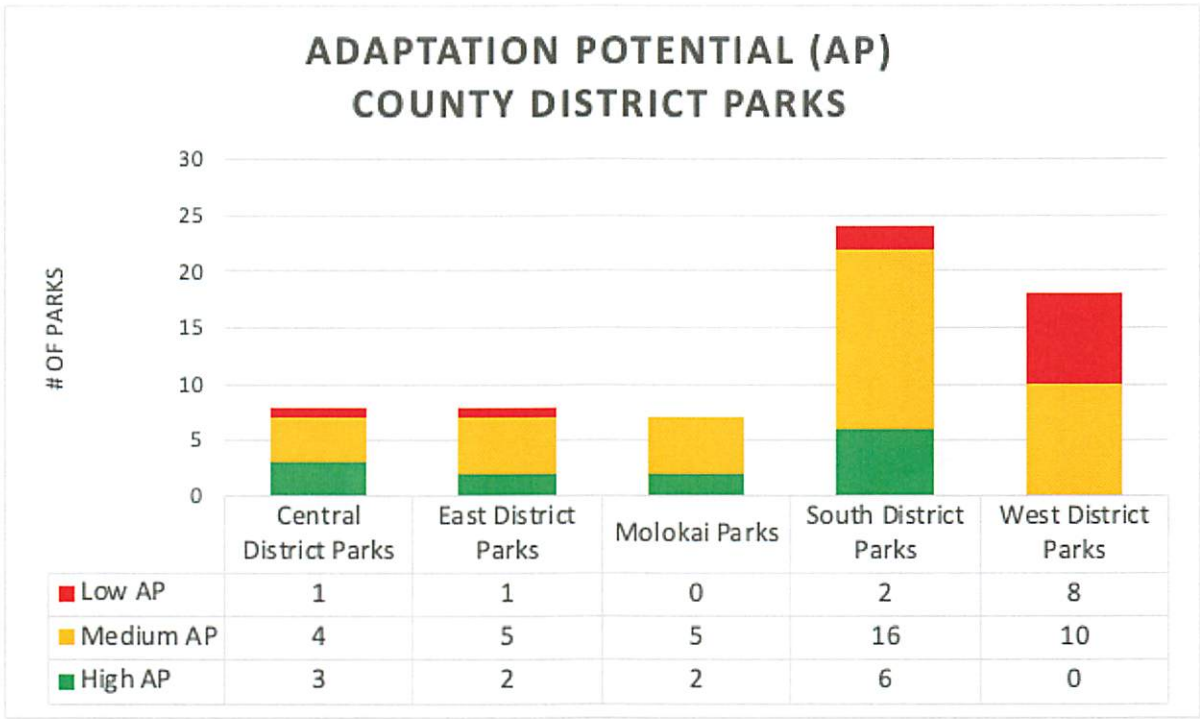
Adaptation Potential

Over 80 percent of parks have medium to low potential for adaptation to sea level rise based on the five indicators of vulnerability used in this study. Some parks with a low or even medium adaptation potential may not be viable in the future because sea level rise will inundate the entire park area and access to it from roads.



The adaptation potential of each park was rated as low, medium, or high based on the five indicators of future conditions. A park that receives a rating of low adaptation potential indicates that a park is highly vulnerable to sea level rise based on the five indicators and that significant adaptation measures would be required to maintain park viability. Low adaptation potential may indicate that park viability is in jeopardy.

Parks in the West District have the greatest number of parks with low adaptation potential. Many of these narrow parks have little to no room to expand landward constrained by the highway and development.

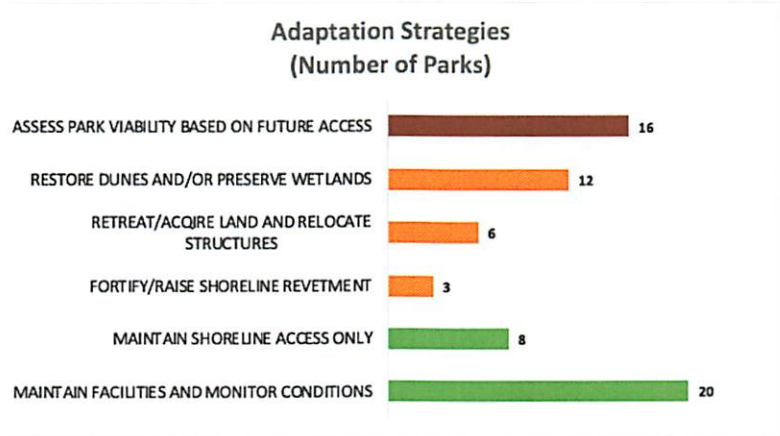


	Central District Parks	East District Parks	Molokai Parks	South District Parks	West District Parks
Low AP	1	1	0	2	8
Medium AP	4	5	5	16	10
High AP	3	2	2	6	0

Adaptation Strategies

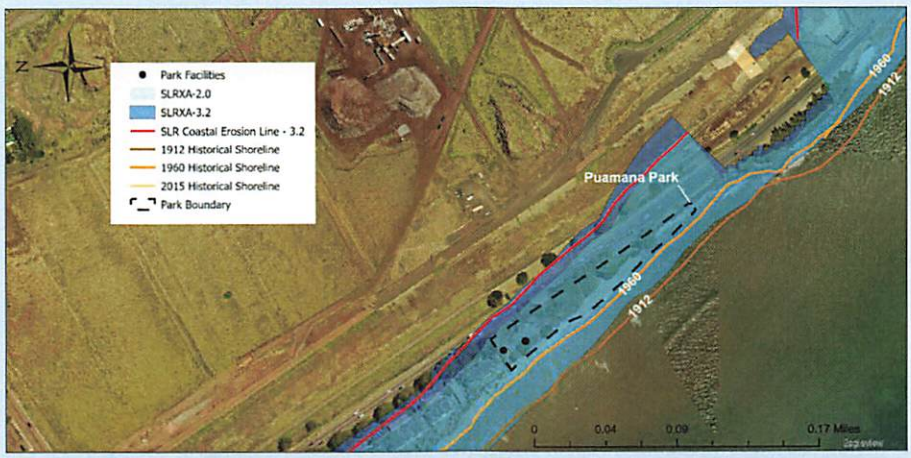
This study identified six primary adaptation strategies and associated actions to increase the adaption potential of each park. Each park was assigned a primary adaptation strategy based on the results of the vulnerability study and other site-specific factors. These strategies are described below.

The six adaptation strategies describe the range of approaches considered for the 65 parks. Almost one third of parks (16 parks in dark brown) are the most vulnerable to sea level rise and their viability is based on future access and the plans of other departments for roads and highways. Another third of parks (20+8 parks in green) are less vulnerable to sea level rise and shoreline access and facilities can be maintained. In the middle, the remaining one third of parks (in orange) are vulnerable and require active adaptation through restoration and preservation of dunes and wetland, retreat and acquisition of land, and fortification of shoreline revetments.



ACCESS PARK VIABILITY BASED ON FUTURE ACCESS.

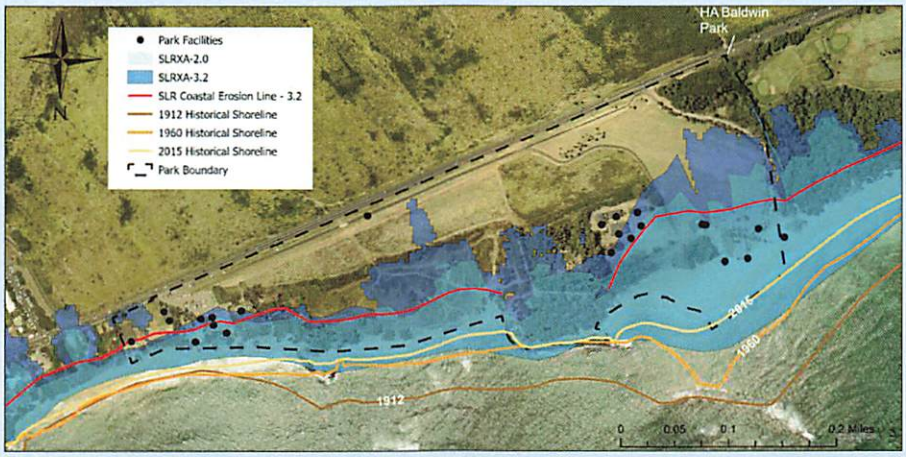
The viability of sixteen parks, primarily along the west and south Maui and one on Molokai, depends on adaptation planning for highways and roads. In many cases, the SLRXA3.2 zone covers 100 % of the park and roads and highways the provide park access. This strategy focuses on coordination with state and county entities to determine future access and hence park viability. Parks assigned to this adaptation strategy have low to medium adaptation potential. Fifteen beach parks along the west and south districts of Maui and one park on Molokai were assigned this adaptation strategy. Some of these parks include: Puamana Park, Ukumehame Beach Park, and Memorial Park (Mai Poina 'Oe Ia'u).



Puamana Park

RESTORE AND PRESERVE DUNES AND WETLANDS

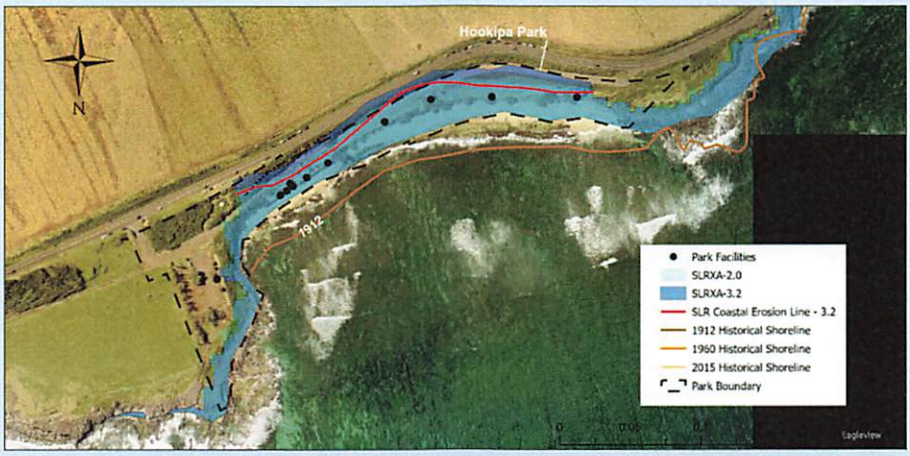
Dune and wetlands restoration and preservation is recommended for 12 parks especially along the north central and eastern portions of the Island of Maui with substantial dunes and marine sands. This strategy focuses on nature-based adaptation for parks with the potential to support dune and wetland restoration and preservation. Dune and wetland restoration and preservation will provide natural protection to park infrastructure from coastal hazards such as erosion, high waves, and storm surge. Existing and emerging wetlands mitigate flood hazards. Both sand dunes and wetlands provide habitat for native plants and wildlife. Most parks assigned to this adaptation strategy have a medium adaptation potential. Ten parks along the central, south, east districts of Maui and two parks on Molokai were assigned this adaptation strategy. Some of these parks include: Baldwin Beach Park, Kanahā Beach Park, and Kamaole III Beach Park.



Baldwin Beach Park

RETREAT/ACQUIRE LAND AND RELOCATE STRUCTURES

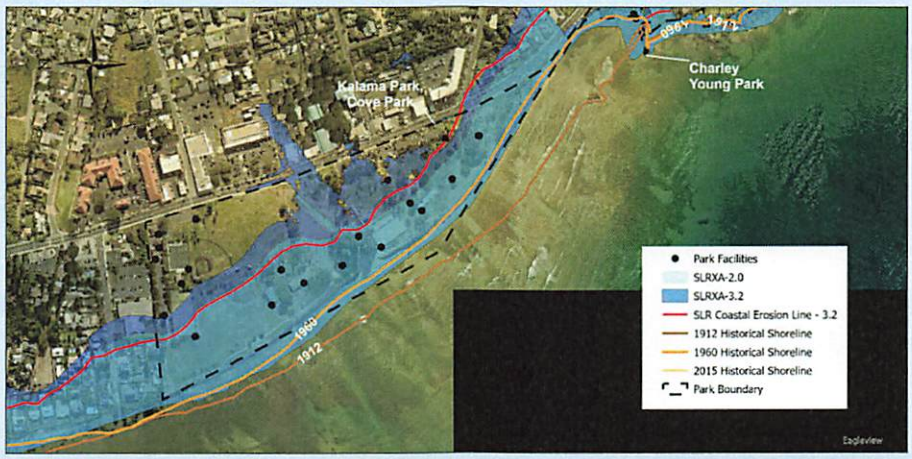
Some parks will require retreat and land acquisition to maintain recreational uses. In some cases, retreat will not be feasible and adjacent land will need to be acquired. This strategy focuses on maintaining park uses by removal and relocation of structures and acquiring of additional land as needed. Parks assigned to this adaptation strategy have a medium to low adaptation potential. Nine parks along the west, south, central, and east districts of Maui were assigned this adaptation strategy. Some of these parks include Ho'okipa Beach Park, D.T Fleming Beach Park, and Hoaloha Beach Park.



Ho'okipa Beach Park

FORTIFY/RAISE SHORELINE REVETMENT

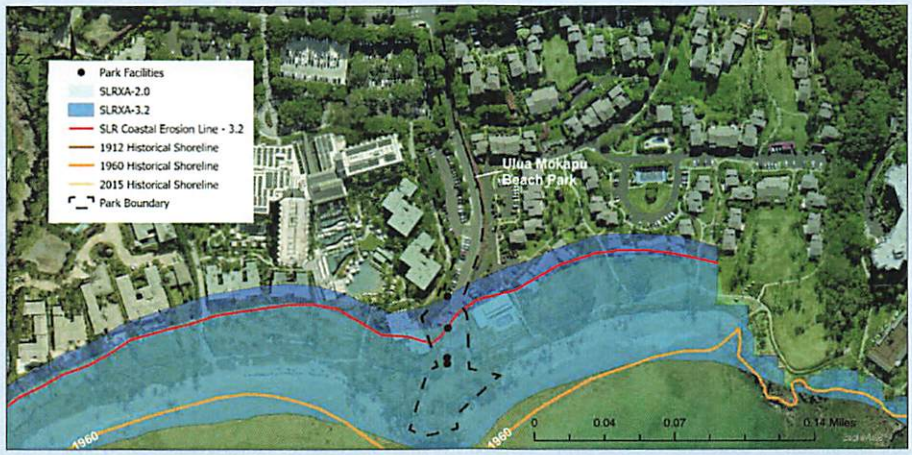
Three parks have existing shoreline revetments. These shoreline revetments will need to be fortified and potentially raised to maintain park viability. A variety of technical studies may be needed to determine the feasibility of this strategy or identify alternatives. This strategy focuses on determining the feasibility of fortifying and raising shoreline revetments to maintain existing recreational uses. In some cases, alternative strategies may be considered such as returning the park shoreline to a natural environment. Parks assigned to this adaptation strategy have a medium adaptation potential. Three parks along the west and south districts of Maui were assigned this adaptation strategy. These parks include Kalama Park, Kamehameha Brick Palace, and Lahaina Courthouse Park.



Kalama Park

MAINTAIN SHORELINE ACCESS ONLY

For eight parks, mostly along the south coast of Maui, maintaining shoreline access as sea level rises may be the only option at this time. This strategy focuses on retaining shoreline access through existing park land. Coastal erosion with sea level rise will result in the loss of many beaches enjoyed by residents and visitors. Even with beach loss, access to the shoreline needs to be retained. Parks assigned this strategy are in highly developed areas. Seven parks in south Maui and one park in west Maui were assigned this adaptation strategy. Some of these parks include: Ulua/Mokapu Beach Park, Wailea Beach Park, and Pohaku Park.



Ulu/Mokapu Beach Park

MONITOR AND MAINTAIN FACILITIES

Twenty parks have a relative high adaptation potential and can be maintained as is over time as long as no new structures are put in hazard areas. This strategy focuses on monitoring and maintaining facilities until park conditions change. Any new facilities should be located outside the SLRXA-3.2 and other hazard prone areas. Twenty parks in all districts were assigned this adaptation strategy. Some of these parks include Keanae Park, Keopuolani Regional Park, and Halawa Park.

Keanae Park

Recommendations

Key recommendations from this study fall into four categories: (1) policies, (2) adaptation planning and implementation, (3) education and outreach, and (4) near term investment priorities.

POLICIES

Building on the Maui Islands Plan (MIP) park objectives and the results of this study, the following additional policies are recommended for parks located in areas exposed to sea level rise:

1. **Protect** public safety by removing park structures, features, and trees partially or fully damaged or exposed by severe coastal flooding and storm events
2. **Apply** district-specific cultural protocols/vetted actions for adaptation design and/or storm impacted parks developed in coordination with relevant state and county entities and cultural and lineal descendants
3. **Prioritize** nature-based, low impact, and ocean dependent recreational uses in long-range planning for parks exposed to sea level rise
4. **Limit** construction of new park facilities in parkland exposed to 3.2 feet of sea level rise
5. **Retain** undeveloped park land outside hazard areas for future parks
6. **Coordinate** with county departments and state agencies on adaptation planning for infrastructure, especially highways and roads that provide access to parks

ADAPTATION PLANNING AND IMPLEMENTATION

DPR should consider transitioning from preparing master plans to adaptation plans for county beach parks and other sites affected by coastal threats. While there is significant overlap between the two types of plans, an adaptation plan incorporates an adaptive management approach and is driven by site specific vulnerabilities. Phase I of this study identified primary adaptation strategies for each park. Phase II of this study will develop adaptation plans for specific parks and develop a process that can be applied to all parks. DPR may wish to adopt a tiered-approach to adaptation planning developing more comprehensive plans for large parks with complex issues and simpler plans for those parks which require less technical studies.

EDUCATION AND OUTREACH

DPR staff will need additional training and technical support to use and update the study results and web-based application. A regular public outreach and engagement strategy should be developed and implemented for each District. A citizen-science program could be established to engage residents in monitoring the impacts of coastal hazards on parks.

NEAR-TERM INVESTMENT PRIORITIES

- Develop **district-specific cultural protocols** for park adaptation in coordination with cultural practitioners and lineal descendants
- Develop **adaptation plans and detailed site plans** for one third of the parks that require active adaptation
- Develop a **beach park adaption fund** based on cost estimates for the removal of structures, features, and trees likely to be affected by high waves and coastal erosion in the near term.

Conclusions

DPR needs to start adaptation planning now for sea level rise impacts, even though some impacts may not be realized until 30 years or more in the future. New acquisition and undeveloped parkland will be needed to replace existing parks lost to sea level rise. Facilities exposed to sea level rise will need to be removed and relocated as appropriate. DPR should use the findings of this study in long-term planning and evaluating all CIP projects. The impacts of sea level rise on county parks cannot be solved by the DPR alone and involves almost all county departments and some state agencies. Access to parks via state highways and county roads and the provision of power, water, and wastewater services will require coordination in planning and execution to ensure the future of Maui County's park system.

Kanahā Beach Park

Ho'okipa Beach Park