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Investigation into Florida's 2024-25 Great Outdoor Initiative

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ABSTRACT

This study examines the ecological implications of Florida's 2025 Great Outdoors Initiative, specifically focusing on the proposed recreational development at Jonathan Dickinson State Park (JDSP) in Martin County. The research investigates how converting portions of JDSP's natural landscape into recreational facilities, might impact crucial ecosystem services, with a specific focus on coastal vulnerability.

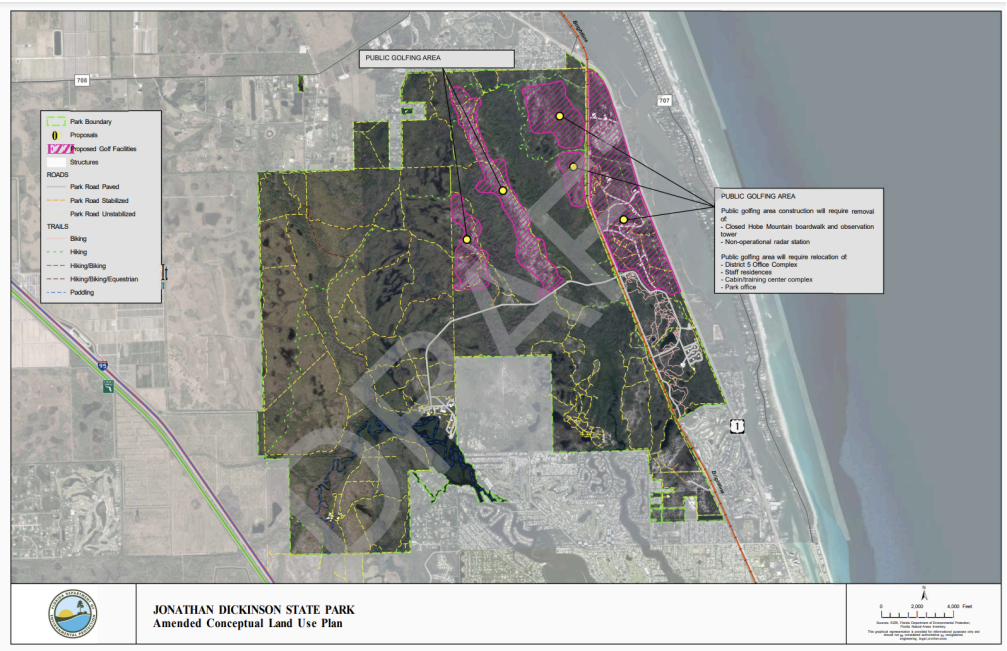
Using the InVEST Coastal Vulnerability model, this study analyzes how the proposed changes might affect the park's ability to protect adjacent coastlines. It is determined that the coastal habitats of JDSP play a significant role in protecting the adjacent coastline from vulnerability and protection varies when the removal of only scrub habitat is simulated to mimic the habitat removal that could occur due to the proposed plans. The investigation notes that there are many other ecosystem services that the park provides other than protection from coastal vulnerability and further studies should be conducted to investigate the value of these services.

INTRODUCTION: OBJECTIVES & BACKGROUND

In August of 2024, the Florida Department of Environment (DEP) proposed plans for their 2025 Great Outdoors Initiative, which aimed to convert portions of nine state parks across Florida into recreational facilities, including lodging areas, pickleball/tennis courts, and golf courses [1]. Following significant community opposition and extensive public comment participation, the proposition was placed on indefinite hold. However, recent discussions indicate that Florida's Governor intends to redraft and reintroduce a revised version of the proposal during the next legislative session [2].

Among the nine parks targeted for development, we will be examining the ecological implications of these recreational expansion plans at Jonathan Dickinson State Park (JDSP) located on the eastern coast of Martin County. Sitting at 10,500 acres, this park is a crucial ecosystem whose services extend far beyond recreational value[3]. While the proposed plans are not entirely clear, the Unit Management Plan Amendment proposes “two separate outdoor recreation spaces” which include “publicly accessible golf course facilities (see Figure 1), related amenities, and facilities to support operations.” The same document also notes that this will create a need to relocate the on-site management office complex, staff residences, and other ancillary facilities along with the removal of the Hobe Mountain observation tower [4], which marks the highest natural elevation in South Florida and is a place of cultural and historical significance [5].

Figure 1. Proposed Public Golf Course Facilities at JDSP[6]

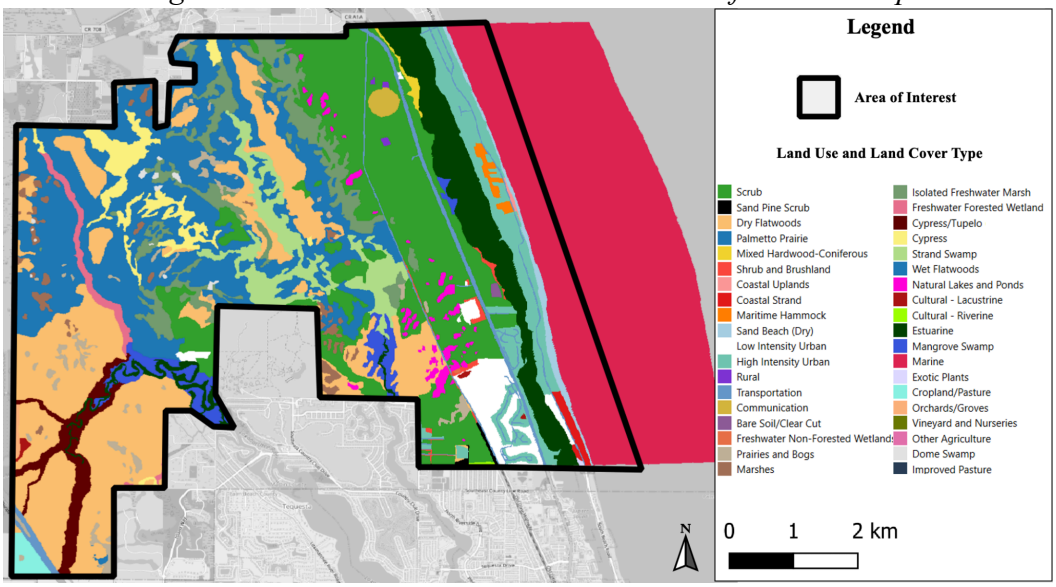


These proposed modifications to JDSP's natural landscape raise critical questions about the potential impacts that this type of development will have on coastal vulnerability and carbon storage capacity – two ecosystem services that are increasingly vital for Florida's changing climate. Given ample time and a full suite of resources, we would aim to understand if the ecosystem services that JDSP provides in its current form are more valuable to the State when compared to the value that the proposed plans can provide. Since we are time- and resource-constrained, we will instead be investigating the ecosystem services JDSP provides concerning coastline vulnerability.

PROJECT APPROACH / DESIGN / METHODS

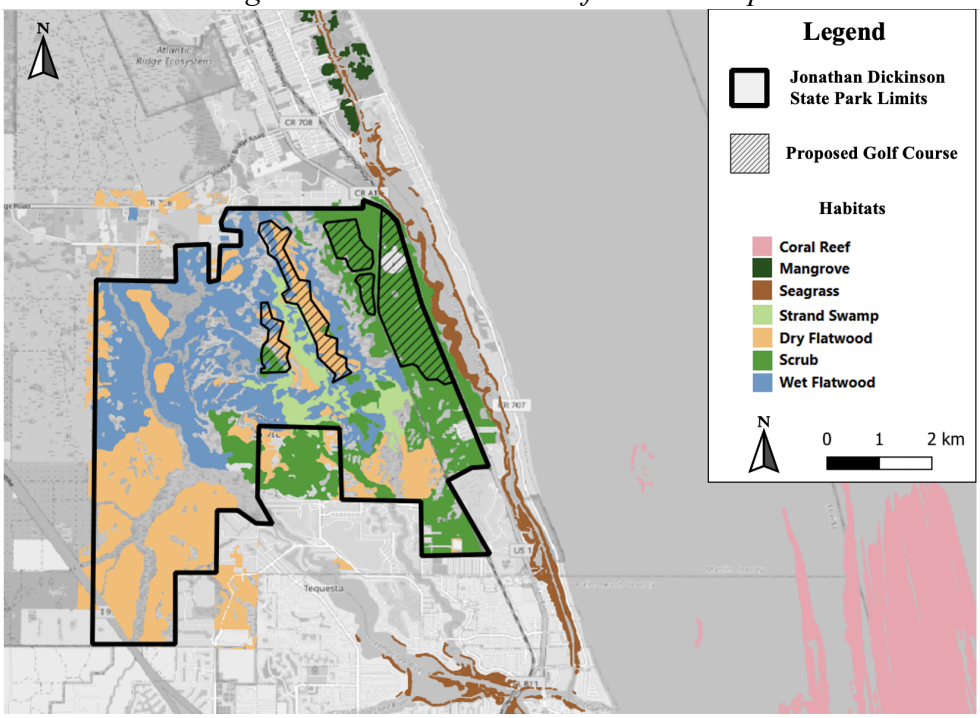
We began by gathering essential spatial data required to run the InVEST Coastal Vulnerability model [7] from open-source databases, including Florida's statewide Land Use/Land Cover (LULC) raster data from the Florida Fish and Wildlife Conservation Commission [8], a 4-ft Digital Elevation Model (DEM) raster from the Florida Geospatial Open Data Portal [9], as well as utilizing the Natural Capital Project Grand Bahamas sample data [10] to obtain the landmass polygon, continental shelf polygon, bathymetry raster and WaveWatchIII data which all included Florida’s East coast. It should be noted that we edited the Florida land mass polygon to include the intercoastal as the data in that file was not as precise as we wanted it to be. Figure 2 displays the land cover types in and around JDSP.

Figure 2. Land Use and Land Cover in Area of Interest Map



Our Area of Interest (AOI) extends beyond JDSP's boundaries to accommodate the InVEST Coastal Vulnerability model requirements, encompassing both the Intracoastal coastline adjacent to JDSP and the parallel ocean coast. From the LULC data, we identified four primary habitat types within the proposed golf course area: Strand Swamp, Wet Flatwood, Dry Flatwood, and Scrub. Additionally, we incorporated three coastal habitats (mangrove, seagrass, and coral reef) from global datasets [11, 12, 13] that fall within the park's "protection distance." Figure 3 shows these key habitats in relation to JDSP's boundaries and the proposed golf course location.

Figure 3. Natural Habitats of Interest Map



We created a habitats table (CSV) containing each habitat's file path, rank, and protection distance. Following the InVEST user guide, we assigned protection ranks from 1 (very high protection) to 5 (very low protection) based on each habitat's capacity to protect the coastline. We matched our habitat ranks to similar ones described in the table listed in Appendix 2 of the user guide - for instance, we ranked Strand Swamp as a 2, corresponding to the Marsh habitat's ranking of 2.55 [7].

Protection distance represents the maximum distance at which a habitat provides coastline protection. For habitats lacking published protection distance data, we followed the recommendation from the InVEST Coastal Vulnerability User Guide Appendix 2 recommendation to estimate this parameter by measuring the distance between the habitat and shoreline [7]. We calculated the average distance between the intracoastal and ocean coastlines to establish these values. While these estimation methods have limitations, they provide reasonable approximations for habitat ranks and protection distances in our analysis. Table 1 shows the habitat data used in our initial model run which represented the pre-project habitat protections.

Table 1. Habitat Data Table

Habitat	**Rank**	**Protection Distance (m)**
Coral	1	2000
Seagrass	4	500
Mangrove	1	2000
Strand Swamp	2	3000
Wet Flatwood	3	2000
Dry Flatwood	3	2000
Scrub	3	1000

Following our initial analysis, we removed the scrub habitat from the model to simulate the proposed golf course development. We selected scrub habitat for removal since it is the primary habitat type that would be displaced according to the proposed development plans (Figure 3).

FINDINGS AND ANTICIPATED BENEFITS

When comparing the current scenario exposure index rank results to the results of the no habitat scenario we have results that back up what we expected to see. Exposure risk rank increases along both the ocean coast and intercoastal coastline along the boundary of JDSP (Figure 3). Additionally, we found that the considered habitats play an important role in reducing the exposure index for both coastlines considered (Figure 4).

Figure 3. Exposure Index Rank Results Current Scenario vs No Habitat Scenario

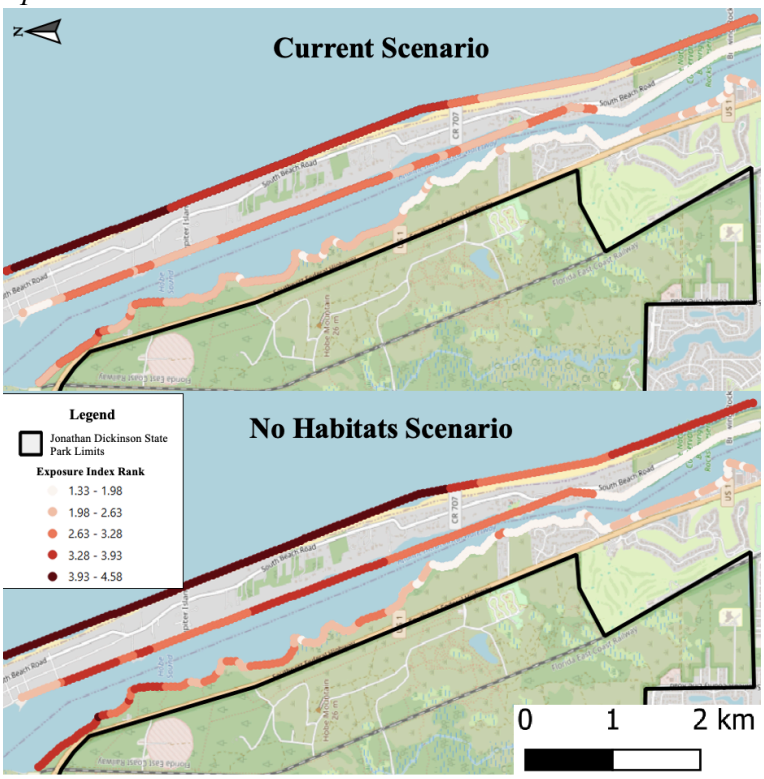
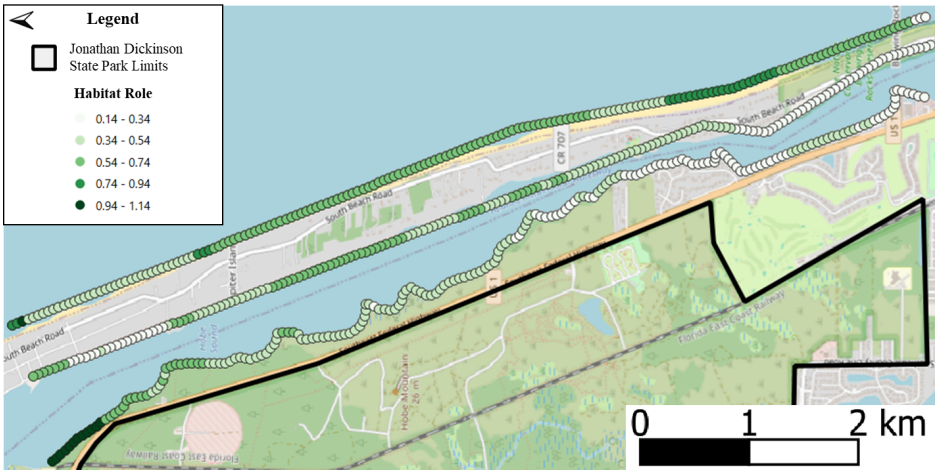


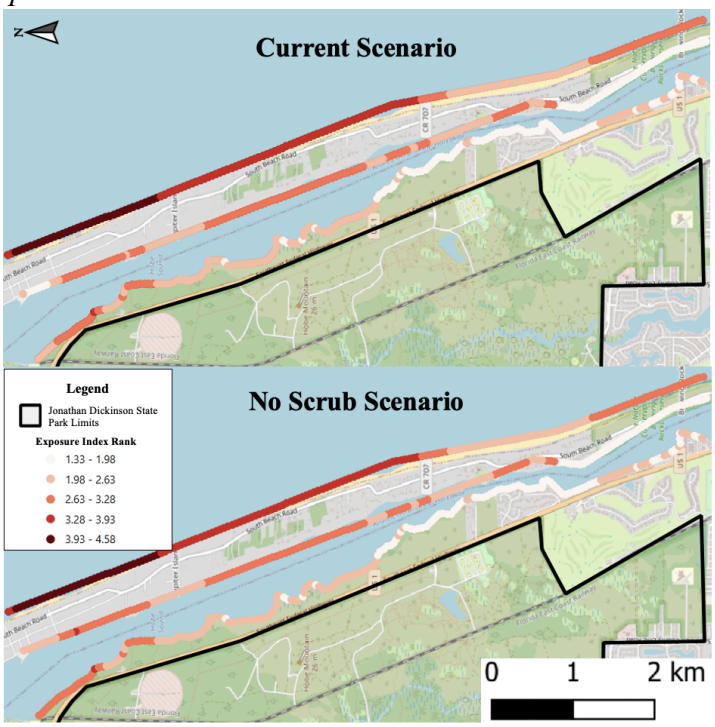
Figure 4. Habitat Effect on Coastal Exposure Rank



Diving deeper to explore the effects of the great outdoor project, we ran the model having removed the scrub habitat. This analysis revealed an increase in coastal risk exposure in the northeastern corner of JDSP (Figure 5), coinciding with one of the proposed golf course locations. This small hotspot of change in rank indicates that the scrub is providing an ecosystem service of coastal protection from vulnerability. The modest increase in exposure rank could be attributed to several factors. The presence of other protective habitats in the vicinity, such as mangroves and seagrass, continues to provide coastal protection services. The relatively inland location of the scrub habitat compared to other coastal protective features may also minimize its

immediate impact on coastal vulnerability. Additionally, the model's limitations in fully capturing the complex interactions between different habitat types, the maintained presence of topographic features that contribute to coastal protection, and the spatial resolution of our input data may not capture fine-scale changes in habitat structure.

Figure 5. Exposure Index Rank Results Current Scenario vs No Scrub Scenario



Our findings prompted us to consider the broader spectrum of ecosystem services that JDSP provides beyond coastal protection. We identified several additional research directions using the InVEST suite of models. The Nutrient Delivery Ratio model could help quantify how the proposed golf courses might impact surface water quality and infiltration/sediment retention, potentially translating these impacts into avoided water treatment costs. Furthermore, investigating the effects of fertilization on the park's endangered species could reveal critical environmental consequences. The Urban Cooling model could provide insights into the differential effects of golf turf versus natural landscapes on local climate, as research indicates golf turf has higher evapotranspiration rates than most naturally occurring landscapes [14]. These changes could affect surrounding communities' energy costs for cooling and their overall health and well-being.

Beyond these quantifiable ecosystem services, our analysis raised important social equity considerations. The current state park provides universal access to natural spaces and recreational opportunities. Converting portions to a golf course would potentially restrict access based on economic factors, such as equipment costs and green fees, as well as time availability. This transformation raises questions about the democratic distribution of natural resources and recreational opportunities within the community. These social considerations, combined with our quantitative findings, suggest that maintaining the current natural habitat may provide greater overall benefit and ecosystem services to the broader community than the proposed plans.

REFERENCES

1. Florida Department of Environmental Protection. “DEP Announces 2024-25 Great Outdoors Initiative to Increase Public Access, Recreation and Lodging at Florida State Parks.” *Florida Department of Environmental Protection*, 19 Aug. 2024, content.govdelivery.com/accounts/FLDEP/bulletins/3afd277.
2. Chesnes, Max, and Emily L Mahoney. “DeSantis Says Florida Will Go “back to the Drawing Board” on State Park Plan.” *Tampa Bay Times*, 28 Aug. 2024, www.tampabay.com/news/florida-politics/2024/08/28/florida-desantis-state-parks-golf-course-hotel-pickleball-plan/.
3. Florida Department of Environmental Protection. “Jonathan Dickinson State Park History.” *Floridastateparks.org*, www.floridastateparks.org/parks-and-trails/jonathan-dickinson-state-park/history.
4. Florida Department of Environmental Protection, “ Jonathan Dickinson State Park Unit Management Plan Amendment.”, https://floridadep.gov/sites/default/files/Jonathan%20Dickinson%20UMP%20Amendment%202024_0.pdf.
5. Trail of Florida's Indian Heritage. “Jonathan Dickinson State Park.” *Trail of Florida's Indian Heritage*, 12 Oct. 2022, www.trailoffloridasindianheritage.org/jonathandickinson-statepark/.
6. Florida Department of Environmental Protection. “Jonathan Dickinson State Park Conceptual Land Use Map | Florida Department of Environmental Protection.” *Floridadep.gov*, 21 Aug. 2024, floridadep.gov/parks/public-participation/documents/jonathan-dickinson-state-park-conceptual-land-use-map
7. Natural Capital Project, 2024. InVEST 0.0. Stanford University, University of Minnesota, Chinese Academy of Sciences, The Nature Conservancy, World Wildlife Fund, Stockholm Resilience Centre and the Royal Swedish Academy of Sciences. https://naturalcapitalproject.stanford.edu/software/invest
8. Florida Fish and Wildlife Conservation Commission and Florida Natural Areas Inventory. 2023. Cooperative Land Cover version 3.7. Tallahassee, FL.
9. Florida Geographic Information Office. “Martin County 2016 3DEP 4-Ft.” *Floridagio.gov*, 10 June 2016, geodata.floridagio.gov/documents/e8061eccb86e46219438d872237dbbba/about.
10. Natural Capital Project. “Innovations in Climate Resilient Coastal Zones (the Bahamas).” *The Natural Capital Project*, Stanford University, naturalcapitalproject.stanford.edu/research/projects/innovations-climate-resilient-coastal-zones-bahamas.
11. Bunting P., Rosenqvist A., Lucas R., Rebelo L-M., Hilarides L., Thomas N., Hardy A., Itoh T., Shimada M. and Finlayson C.M. (2018). The Global Mangrove Watch – a New

2010 Global Baseline of Mangrove Extent. Remote Sensing 10(10): 1669. doi: 10.3390/rs1010669.

12. UNEP-WCMC, Short FT (2021). Global distribution of seagrasses (version 7.1). Seventh update to the data layer used in Green and Short (2003). Cambridge (UK): UN Environment World Conservation Monitoring Centre. Data DOI: https://doi.org/10.34892/x6r3-d211
13. UNEP-WCMC, WorldFish Centre, WRI, TNC (2021). Global distribution of warm-water coral reefs, compiled from multiple sources including the Millennium Coral Reef Mapping Project. Version 4.1. Includes contributions from IMaRS-USF and IRD (2005), IMaRS-USF (2005) and Spalding et al. (2001). Cambridge (UK): UN Environment World Conservation Monitoring Centre. Data DOI: https://doi.org/10.34892/t2wk-5t34
14. Wynne, T., & Devitt, D. (2020). Evapotranspiration of Urban Landscape Trees and Turfgrass in an Arid Environment: Potential Trade-offs in the Landscape. *HortScience horts*, *55*(10), 1558-1566. Retrieved Dec 6, 2024, from https://doi.org/10.21273/HORTSCI15027-20