2024

Coastal Beach

&

Dune System Review

at Ocean Village,

South Hutchinson Island, FL

Beach and Dune Committee at Ocean Village
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Purpose and Scope

The purpose of this report is to chronicle the history, cultivation, US Army Corp of Engineers' influence, and socioeconomic impact of the coastal beach and dune system at Ocean Village (OV), South Hutchinson Island, Fort Pierce, Florida. The report integrates available beach and dune knowledge bases and simplifies the complexity of scientific data to make it understandable. Our hope is that this provides a basis for future decision-making, community appreciation, and documentation.

Goals: To Examine Ocean Village's:

1. Dune construction history
2. Dune system revitalization post- Hurricanes Jeanne and Francis
3. Dune plant cultivation and current plant status
4. US Army Corp of Engineers' influence
5. Socioeconomic impact of the coastal beach and dune system

The Team

The Beach and Dune Committee at OV at the time of this writing was composed of owners/ volunteers, one of whom is also the liaison to the Property Association Owners (POA) Board of Directors.

Dr. Carolyn Fortuna (chair)

Ross Gillis (Liaison to the POA)

Lee Hearn

Rita Lazzaroni

Lynne Perry

Marty Tormey

Section 1. Methodology

This report is a mechanism to provide insight and analysis to the OV community and those beyond OV who are interested in our beach and dune system as essential elements of coastal morphology. “Coastal morphology” is the study of natural processes ongoing at the shoreline as well as the impact of human interventions within the coastal zone. The increased complexity of coastal zone management requires a wide perspective about historical, ecological, political, and socio-economic knowledge. That means this report is a stylized coastal morphological analysis.

The natural processes evident at the OV beach and dune system are a specialized interplay of water and sand, and it is under the influence of tides, wind, weather, and waves. These impact sediment supply and vegetation and help to form the variable physical base that constitutes the coastal foredune in the OV beach profile and the inland dune field extension.

In addition to natural events, dune systems are exposed to different types of human-related disturbances which can cause both direct (trampling, grazing, sand and water extraction, leveling of dunes) and indirect damage (climate change, sea level rise, and alterations in soil, moisture regimes, and sediment supply). The beach and dune system at OV is directly affected by human attitudes and behaviors -- of OV owners and local, county, state, and federal interventions.

At OV, the Beach and Dune Committee advises the POA Board of Directors, its property manager, and Association owners about coastal issues relative to our half-mile beachfront. We bring our knowledge into an appropriate form and scale for these audiences through advocacy -- we write a monthly column in the Association newsletter, the *Seaword*; report out to the community at the monthly POA Workshop; organize beach cleanups and participate in a monthly reporting of litter pick-up with other South Beach groups; collaborate with other OV committees; host educational guest speakers who discuss relevant coastal morphology topics; network with experts at county and state levels; attend conferences like the Florida Shore and Beach Preservation Society; and other means.

As a primarily qualitative analysis, this report draws from and analyzes a variety of sources. The *Seaword* is a repository of historical narratives. Artifacts from the former dune manager, Robert Barron, shed a keen light on the evolution of dune plant cultivation over

nearly 20 years. The US Army Corp of Engineers' documentation about the beach and dune accretion as a result of area sand replenishments has been significant. The POA contracted for a dune survey in 2017, now referred to as the Roland E. Rollins Professional Land Survey. Data collected by federal, state, and county sources help us to understand the current status of and future implications for the OV dune system.

These and other sources inform this report.

Section 2. History of the Dune System

Contributor: Eileen Emery

I. The Beginning: Sea Oats on the Original OV Dune

Sea oats, once common along the southern Florida coastline, had been eradicated from most areas to which they are indigenous on the Treasure Coast by the time that OV was founded. This was doubly unfortunate, for not only do these fragile plants enhance the beauty of a beachfront site, but they also provide a substantial deterrent to beach erosion. Realizing the considerable value of sea oats, Ocean Village developers and a team of interested owners, working with the Bureau of Beaches and Shores of Florida's Department of Natural Resources, undertook a massive project aimed at reintroducing them to the 3000-foot stretch of OV private beach.

The planting of 60,000 seedlings took place circa 1976 on what was the beginnings of a restored dune line at OV. Previous attempts to grow sea oats in other areas had met with little success because sea oats do not grow well from seeds; wind action often dislodges seeds in the shifting sands. But, using what was then a new technique—a specially developed biodegradable mat in which nursery-grown seedlings are implanted, and then the mats are rolled out in strips along the dune surface—OV's sea oats thrived.

Four years later, the OV dunes from what is now known as Crossovers 2 through 5 were thickly covered with sea oats up to six feet tall, and their successful reintroduction became a model for similar dune restoration projects elsewhere. To all who enjoy the beauty of these graceful plants, as they sway to breezes along the sands, they are a reminder of the commitment to keep OV sustainable alongside a keen respect for nature.

II. The Formation of the Beach and Dune Committee

If you can, close your eyes and imagine Ocean Village with no dune. It is 1976. Drive into the gated community, and, as you approach the roundabout, you have a clear view of the

ocean. The only obstruction is the slight slope of the beach and a spattering of Norwegian pines. With the ebb and flow of tides, storms, and nor'easters, a slight sandy elevation emerges. Sitting at the main pool, you can see the ocean. There are no steps to climb -- just a small wooden walkway, and you are on the beach.

Eight years later (1984) a November nor'easter flooded OV; 62 cars were destroyed. Two years later, in 1986, the first owner-controlled OV Board of Directors took office. During this 10-year period, the distance between the pool, restaurant, and beach club was substantial. A large playground was located east of the main pool, as were a 4 ft. wide sidewalk and additional flat ground. Between the restaurant and crossover 3, a 9-hole pitch-and-putt was located.

The Beach and Dune Committee (BDC) was formed by Martha Hardy when she was VP of OV POA around 1987. She and Audrey Napp led the new Committee, and Eileen Emery joined them in 1990. During Ms. Hardy's early years on the BDC, she sought OV membership in the Florida Shore and Beach Preservation Association (FSBPA), and these three members attended FSBPA conferences.

Ms. Hardy spearheaded the construction of a viable OV dune system. She led the hiring of Coastal Tech, owned by Michael Walther of Vero Beach, to design, permit, and construct the dune as we know it today. The assessment for the dune creation was $500 per OV unit. This process took three years. Eventually, five sets of stairs/ crossovers were erected after the dune was established, with an eventual 14 to 16 stairs on both the ocean and west facing sides of the dune.

In 1995, along with the City of Fort Pierce and St. Lucie County, OV hired a lobbyist for assistance to address the high beach erosion rate. Howard D. Marlowe advocated for ongoing sand renourishment on the southern side of the Fort Pierce Inlet. During the first 3 years of resulting sand replenishment, well over half of the sand was deposited by drift in front of the OV beach.

In addition, while she was president, Ms. Hardy started the dune reserve at $1 per month per owner. This helped to offset the cost of maintaining and improving the dune structure. The general operating fund today pays for dune plantings, irrigation, and maintenance, while a Dune Reserve is held separately in the event repairs are needed after a devastating storm.

When Ms. Hardy moved north in 1997, Kris Eriksson took her place as BDC chair and continued until 2002, when Ed Pryor became the BDC chair. Across these years, the BDC's mission has continually been to assist the POA in maintaining and improving the OV beach and dune system.

III. The Effects of Hurricanes Jeanne and Francis

Many influences can change the state and stability of the OV dune system. While dune plants can generally tolerate harsh beach conditions including wind, salt spray, storms, scarce nutrients, limited fresh water, and intense sunlight and heat, outlier conditions can and have altered the OV dune system.

When Hurricane Jeanne and Hurricane Francis (2004) arrived, OV was the only area in the region with a constructed, designed dune. South Hutchinson Island had ocean flood waters move up to north A1A. The largely undeveloped 10-mile stretch of Hutchinson Island experienced severe flooding and overwash impacts of both storms. Substantial storm surge overwash was experienced throughout the area, resulting in many structures like swimming pools and ground floors of condominiums being flooded and filled with sand deposits.

It is important and interesting to note that no unit in OV flooded then (or since).

The OV dune was topped in 3 places:

- on the south end between Seascape 2 and Ocean House;
- the southern end of Ocean House; and,
- the north end by Seascape 1.

Following these hurricanes, the existing dune near the restaurant was still in place, but it had been spread west. The main pool was filled with sand. Mainsail Drive had to be plowed to remove the accumulated sand. The two tennis courts behind the OV Community Center were covered with at least 2 inches of sand. Most of the crossovers remained intact, although minor repairs were needed on the stairs and railings.

Section 3. Cultivation Evolution of Dune Plants

I. First Stages: A Comprehensive Dune Design

Sand dunes are naturally occurring dynamic coastal features which are formed by the accumulation of wind blown sand. Sand dunes are the first line of defense against ocean storms and act as a buffer to protect upland property and natural habitats. They provide a flexible barrier to the movement of high tides and waves, reducing erosion.

If sand dunes are damaged or destroyed, homes and coastal resources can experience negative and sometimes catastrophic effects. When sand dunes are damaged from storms, they can be repaired or restored. The post-Hurricanes Jeanne and Francis OV dune reconstruction project was driven by Ed Pryor -- a one person OV force, aided in part by the OV property manager, George Maher. One month after Hurricanes Jeanne and Frances, a Florida Department of Environmental Resources permit was obtained for dune repair and ongoing management. Together, Mr. Pryor and Mr. Maher sought out Robert Barron, who took on the role of OV dune designer and manager for the next 20 years.

The OV dune restoration project was undertaken with the five elements of a comprehensive dune management plan in mind:

1. Grassy foredune husbandry -- to install sea oats and other fast growing species to capture and hold moving sand;
2. Exotic species eradication -- to secure sea oats and other deep-rooted dune plants;
3. Strand zone pruning -- to control competitive spread and replace with more appropriate species;
4. Strand zone enhancement -- to add in additional native and rare dune plants to improve overall dune health; and,
5. Lighting control -- to project endangered sea turtles.

Mr. Barron noted at the 2005 dune restoration that most previous existing vegetation and about 12,000 cubic yards of sand had been deposited upland onto roads and parking lots. The sand had been bulldozed back to reprofile dune berm in December. Immediately afterward, it was important to constrain that sand by bringing in new dune plants.

A crucial decision was made to stabilize the entire dune from Crossover 5 to Crossover 2.

II. Initial Dune Plantings

Mr. Barron began the OV dune reclamation project with an understanding that plants build and anchor the sand dunes, as the roots and stems of sea oats and other native coastal plants trap wind-blown sand. As the sand piles up around the plants, new roots develop on the recently buried stems, while new stems emerge from the sand's surface. This traps even more sand, and the sand dune grows.

Sea oats (Uniola paniculata) play a major role in stabilizing and building dunes and are protected by law. These plants may not be collected and transplanted; rather, seedlings must be obtained from licensed growers. Planting sea oats (or any dune plants) is labor- and time-intensive. It took about 64 seedlings to plant an area of dune that was 10’ x 10’ in area. The best sea oat planting times in Florida are between April and October, yet much of this time coincides with the endangered sea turtle nesting season. Precautions were taken so as not to disturb those precious nests.

Sea oats were planted first and were designed to cover 60-80% of the total area, with the sea oats needing to be planted so that at least 4-6” of the vegetation was buried in sand. Because sand blows around so much, if the plants were not planted deep enough, their roots may have become exposed, and plants might have failed to thrive. This required creating a hole for each seedling that was about 8-12 inches deep but not large in diameter.

Hydrated water-absorbing polymer was added to the hole for each sea oats plant, and they were watered once or twice a week during their first few months of 2005. The frontal dune planting was completed by mid March, and the back dune was finished by the end of April. Pictures from this time indicate that approximately 25 rows of sea oats were planted across the newly reprofiled dune berm.

This dune was fully established by the next hurricane season, produced seed, and captured a foot of sand from Hurricane Wilma in October, 2005 with no damage.

By 2015, the seaward limit of the dune was 80 feet to the east with four to five vertical feet of accretion.

IV. Signs of Successful Plantings

Ideally, management plans of coastal dunes should embrace the planting and maintenance of the natural vegetation, conservation of wildlife, control of visitors, the zonation of activities, and provision of amenities. When managing and preserving the OV coastal dune system, it has been important to bear in mind that species richness and habitat diversity, which by their nature are highly dynamic, are greatest when a full sequence of successional stages is represented.

An ecosystem is a dynamic complex of plant, animal, and microorganism communities and the nonliving environment, interacting as a functional unit. Humans are an integral part of ecosystems. The OV POA Board of Directors as guided by the BDC has been consistent in maintaining this diversity and the natural dynamics of these ecosystems.

For example, after the initial dune restoration, owners shared observations that established saw palmettos had survived Hurricanes Jeanne and Francis with little erosion or damage. Annual dune enhancements then began to add more saw palmettos to backdune areas; they were each planted at a 24 inch size with temporary drip irrigation. Placement was scattered with other strand shrubs on the backdune slope. They grew about one foot per year to reach mature height and spread in five to six years.

The status of the vegetation varies section to section, and the individual Crossover sections have been monitored diligently. A transverse short normal section shows that the installed dune grasses have captured windblown sand in several shore parallel ridges to create an elevated foredune with an undulating backdune swale. Mr. Barron reminded the OV BDC that a number of areas have been and will always likely be contaminated with invasive, exotic, and native pest plant species, which can threaten the stability and beneficial function of the dune system.

V. A Dune Plant Tally a Decade Later

In 2015, to analyze the success of the post-Hurricanes Jeanne and Francis revitalization project, Mr. Barron compiled a list of extant OV dune flora that he had planted since Hurricanes Jeanne and Francis: their common names, taxonomies, and abundance.

Primary plantings

Agave (agave decipiens): few

Bay cedar (suriana maritima): few

Beach bean (canavalia rosea): scattered

Beach elder (iva imbricata): scattered

Beach groundcherry (physalis augustifolia): scattered

Beach tea (croton punctatus): few

Buttonwood (conocarpus erectus): few

Chalky bluestem (andropogon virg.): few

Coast sandbur (cenhorus tribuliodes): scattered

Cordgrass (spartina patens): scattered

Dune panic grass (Pancium amarum): common

Dune sunflower (helianthus debilis): scattered

Golden creeper (ernodea littoralis): scattered

Grey nickebean (caesalpina bonduc): few

Railroad vine (ipomea pes-caprea): scattered

Seagrape (coccoloba uvifera): scattered

Sea Lavender (argusia gnaphaoldes): few

Shore paspalum (paspalum vagin.): common

Spanish needles (bidens alba): scattered

Spurges (chamaesyce spcs.): scattered

Inkberry (sczerola plumieri): scattered

Saw palmetto (serenoa repens): few

Seashore dropseed (sporobolus vifgi.): common

Sea oats (uniola paniculata): common

Spanish bayonet (yucca aloifolilia): few

Exotic species

Australian pine (casaurina equisetifolia)

Brazilianpepper (shinus terebinthifolia)

Creeping oxeye (wedelia tribobata)

Durban crowfootgrass (dactyloctenium aegyptum)

Hawaiian seagrape (scaevola taccada)

Oyster plant (tradescantia spathacea)

Invasive native species

Coin vine (dalgerghia ecastophylum

Grey nickebean (ceasalphnia)

Section 4. US Army Corp of Engineers' Influence

Contributors: Lynne Perry and Marty Tormey

The OV POA owns the OV expanse of beach and dunes from the north property line near Seascape I, to the Ocean House Association (OH) property line adjacent to Seascape II, to the mean high water mark. The OV beach and dune system has been growing since it was first established.

Today, the 3100+ foot vegetated dune system and beach are in healthy and stable condition. Owners and their guests use crossovers to access the OV beach, but many of these beach-goers know very little about the dunes and their importance to OV. In addition to being the home of numerous types of plants, the dunes provide a beach; prevent wave action against the owners' property; hold back storm surge; prevent flooding; and, protect against the wind.

At the time of this report writing, the OV dunes are healthy, but it's important to chronicle what has been and is being done behind the scenes to make sure they remain sturdy enough to resist high winds and strong waves. Proper care and maintenance and consideration of monitoring data from government agencies that relate to dune size are vital for the health of the OV dunes. The goal of this section is to provide insight into what makes the coastal dune system at OV so robust.

Section 1. The Influence of the Fort Pierce Inlet on OV

It is important to note that the dominant littoral drift of sand -- think of a river of sand moving parallel to the shore -- is from north to south along the US Eastern seaboard. Whenever this drift is interrupted by a natural or human made inlet, there is beach erosion to the south.

The Fort Pierce Inlet (circa 1920), part of the federal Fort Pierce Harbor Navigation Project, has had a significant influence on the littoral drift of sand that comes to the Fort Pierce Jetty

Beach and the OV beach. The Inlet has been and continues to be maintained by the federal government under the auspices of the US Army Corp of Engineers. The dunes are greatly affected by federal coastal projects assigned to the US Army Corp. of Engineers (USACE) to manage and largely fund. Funding is also provided by the FL Department of Environmental Protection and St. Lucie County.

The OV beach should be the recipient of a natural littoral shift and resulting sand accretion. However, that natural process has been interrupted by the deeply dredged Fort Pierce Inlet, which limits the natural southerly flow of sand. Instead of accretion, the north-south sand is either carried out into the Atlantic Ocean or inward to the Indian River/ Intracoastal Waterway.

In essence, the Inlet has starved the 2.3 miles of beaches to its south, which, if left untended, would erode the OV beach and eat into the existing OV coastal dune system. Fortunately, the OV dune system continues to expand due to the regular supply of sand delivered by government beach nourishments to the north of OV at the Fort Pierce Inlet. Substantial accretion results from the translation of the new beach sand southward over time.

II. Systematic Sand Renourishment

St. Lucie County initiated a beach restoration project for the first 1.3 miles of beach south of the Fort Pierce Inlet before OV was built. These projects take years, starting with studies of the erosion rate, inlet plans, and, finally, a General Reevaluation Report. The GRR is initiated in conjunction with the USACE, after which follow environmental impact statements and more studies.

The state of Florida agreed to pay the final 10% because this 1.3 mile stretch of beach was termed “public.” Circa 1999 the project was finally approved, and the beach restoration south of the Fort Pierce Jetty started. An initial 830,000 cubic yards of sand were removed by a hopper dredge from Capron Shoal, which is located about a mile offshore from OV. The dredge was tied to the south section of the Fort Pierce Jetty, and it pumped sand along the shore to the south. Bulldozers onshore helped to redistribute the sand.

The sand renourishment south of the Fort Pierce Inlet has continued every few years. Through 2015, about 4 million cubic yards of sand were brought in. Much of that sand was

transported to the OV beach by the north-south current. Yet neither that sand nor more recent replenishments that have arrived on the OV beachfront ever hold fast. While some sand is captured by OV dune plants, the majority continues its southern path on the currents.

Thus, OV depends on a continuing beach nourishment, which, fortunately, has been ongoing in recent years. The following are the latest renourishment amounts.

Year	*Volume (CY)*	*Fill Source*
2018	385,000	Borrow area
2020	460,000	Truck
2021	460,000	Capron Shoal
2023	500,00	Borrow area

The federal renourishment projects strengthen shoreline resilience and reduce storm damages to residential and commercial infrastructure, critical transportation arteries, developed land and coastal armor. They help offset persistent coastal erosion impacts attributed to the Inlet. The 2023 renourishment was 77.76% funded by the federal government and 22.24% funded by St. Lucie County.

In the past two years, a General Reevaluation Report (GRR) was completed by St. Lucie County and sent to Congress for approval. The approval of this GRR would extend federal participation for another 50 years. A later report and National Environmental Policy Act (NEPA) document is scheduled to be completed in 2024 to support a final approval decision of the GRR by the Assistant Secretary of the Army (Civil Works). Additionally, a Project Cooperation Agreement (PCA) amendment with the local sponsor as represented by the St. Lucie County Erosion Control Board was completed on August 20, 2020, which extended the period of federal participation for 6 years.

III. Monument Markers: Identifying the Expanse of the OV Beach and Dune System

Reference monuments, commonly referred to as “R” monuments, are coastal survey markers. They mark key survey points along Florida’s sandy coastline. Three monuments --

R44, R45A, and R46 -- are located on OV property and are the locations used to develop the OV beach/dune profile. These markers are utilized by land surveyors and coastal engineers to measure the beach topography for the purposes of determining erosional or accretional trends and to coordinate mapping of beach restoration projects.

Surveying the OV beach and dune system begins at the monuments on land, but readings are also taken from a small boat offshore. Together, elevation profiles show a substantial increase in the size of the dune since its inception. A comparison of the profile from 2005 to 2021 shows the dunes have increased in height from 10 feet in 2005 to 15 feet in 2021 and in width from 220 feet to 295 feet seaward. That translates to about 5 feet higher and about 75 feet wider.

IV. Sand Trap

The large USACE beach renourishment projects have a significant impact, but other necessary considerations and actions to improve the sand and concurrent coastal dune system south of the Fort Pierce Inlet have also taken place.

Since the early 2000s, St. Lucie County's Erosion Control District has been working with state and federal agencies to explore sand by-passing alternatives. One such alternative is an inlet sand trap that can intercept sands that make their way into the inlet system. The goal is to capture sand before it is deposited within the internal navigation channels and/or are jetted out to sea.

Once retained, this trapped sand would become a cost-effective component in the effort to offset erosion south of the inlet at Fort Pierce Beach. This will be a 60,000-cubic-yard sand trap basin within the Fort Pierce Inlet. The trap will be located north of the federal navigation channel and south of the north jetty, within the throat of the Fort Pierce Inlet. At a cost of $4.3 million, this sand trap will be 200 feet wide, 800 feet long, and 32 feet deep.

V. Aerial Evidence of the OV Beach and Dune System

Documents from the late 2010's help OV to analyze the growth of the dune system as well as its current state. These include photographs available from the FL Department of

Environmental Protection, the Bureau of Beaches and Coastal Systems, and Google Earth Professional.

OV had its own land surveys completed by Roland Rollins in 2018 as well as a drone flyover in February of 2019. The survey was the primary tool showing at specific points along the dune, and its configuration. The purpose of both was to create a new baseline for the size and shape of the dune, which would give the OV community a framework with which to work should another major storm cause havoc and disfiguration.

Section 5. The Dune Catalog in Review

Contributor: Lee Hearn

The OV dune system has formed a variable physical base as the system passes through sequences dependent on ambient sediment supply, wind conditions, stabilizing vegetation, and human interaction. Plants build the dunes by trapping sand, fixing sediments, and increasing soil elevation.

This base constitutes the coastal foredune in the beach profile and the inland extension of the dune fields. The OV dune ecosystem, like all dune systems, is primarily exposed to natural disturbances from storms; however it is also impacted by a few different types of human-related disturbance events. Direct impact damage includes trampling, grazing, sand and water extraction, and leveling of dunes. Indirect damage impacts are climate change, sea level rise, alterations in soil, moisture discrepancies, and variable sediment supply.

Recognizing that sand dunes are home for many plants and animals, in 2023 Lee Hearn, an active member of the BDC, undertook the task of systematically recording the OV dune geomorphology, flora, and fauna. Dunes offer a natural laboratory for scientific research, provide coastal protection and erosion control, and serve as a storehouse for biological diversity. Monitoring is important to establish trends, periodic variations, and aperiodic events in the history of dune system change. This is an important analysis, as over long periods of time it is of particular value to detect dune ecosystems and human impacts, such as invasive plant species and their potential impact.

Chronicling has led to the establishment of a baseline, which is an essential ongoing tool to assess the health of species and the dune itself. The Dune Catalog, which is a written and pictorial document, is an attempt to understand various impacts on the OV dune system as one part of a long term study that continues on with members of the BDC.

Section 1. Native Plants to Florida

This section includes plants that are native to our Dune - defined more specifically as plants that were here before the European Colonization of North America. A fine example of this is the Sea Oat, an unofficial symbol of Ocean Village and a staple on dunes throughout Florida. The Sea Oat is an important native plant to our entire Dune Ecology.

Section 2. Non-Native/ Non-Invasives

It is often thought that the terms “invasive” and “non-native” can be used interchangeably, but this is not always true. In order to be categorized as an invasive, the plant must do harm. This category is for plants that are not native to our dune system/location, however are doing no harm to the environment here. An example of this is the Prickly Pear (Opuntia). It is not a native to our Dune; however, it does not spread aggressively and actually provides some food and shelter to animals and insects.

Section 3. Invasives

These are plants that are not native to our dune system but, in addition, do harm to the ecosystem. The most common examples are invasives that crowd out natives. A specific example of an invasive species in our Dune System is the Creeping Oxeye (Sphagneticola Trilobata). This plant is used in our landscaping; however, it has escaped onto the dune. It grows aggressively and forms a heavy mat. This matting quickly chokes out native species which then eliminates food sources and breeding habitat for many birds and insects.

Section 4. Fauna

Dune plants and animals live in a harsh environment of salt spray, shifting and infertile sand, bright sunlight, and storms. Some of the animals which depend on sand dunes include burrow dwelling beach mice, coach-whip snakes, ghost crabs, nesting sea turtles, least terns, piping and snowy plovers, ground doves, and migrating monarch butterflies. We include many of the dune animals, insects, and lizards in this section. An example is

the Marsh Rabbit, which many people in OV see daily. Additionally we hope to provide some clarity to the many different kinds of lizards in the Village.

The OV Dune Catalog is a separate, comprehensive, extensive document. It will be linked to this 2024 Dune Study when it is completed and compiled.

Section 6. Socioeconomic Impact of the Coastal Beach and Dune System on Ocean Village

The objective of this section of the report is to advance understanding of the benefits of the OV coastal sand dunes -- a value that extends beyond ecological effects and reaches into various recreational, physical, and aesthetic outcomes. Fundamental to the achievement of this objective is a careful analysis of the natural processes as well as the socioeconomic developments that correlate or conflict with those natural processes.

I. Introduction

The OV coastal dunes are a highly valuable multifunctional ecosystem that occupy a unique natural niche on South Hutchinson Island. Supported by natural coastal geomorphic processes, these coastal sand dunes provide an array of important benefits. The presence of a well-established OV dune system, beginning with immature plants in the late 1970s and expanding in size in 2005, has acted as a barrier against storm waves. Thus, it has helped to protect infrastructure that is located landward of the dune system. Indeed, the OV coastal dunes provide direct and indirect economic benefits to the OV owners, their families, and guests due to their location-specific ecosystem, which sit in relative proximity to the 1200 OV condominiums or single family homes. For this reason, as well as the unique coastal ecosystem that it provides, the OV dunes are a protected and precious environment.

The OV dune system has required intensive coastal zone management. This is needed to plan and control the complex interactions between the OV dune as a coastal resource system and its potential uses and users in a systematic and sustainable way. In fact, the original permit to restore and manage the dune system after Hurricanes Jeanne and Francis is still active at this writing. The original project was generally compliant with the permits issued for restoration after the hurricanes, and necessary dune management activities such as exotic removal and pruning continue to be conducted without further input from the State. However, pruning of seagrape and backdune shrubs may be subject to St. Lucie County permitting.

II. Maintaining & Advocating for the OV Coastal Dune System

The OV POA is responsible for the OV expanse of its private beach and adjacent dune system. This extends from Crossover 1 through Crossover 5. Issues related to the OV coastal dune system have required a willingness for the OV ownership group to provide financial support through POA dues.

For a little over 15 years, starting in 2005, Coastal Growers, owned by Mr. Barron, was responsible for a continuing program of dune enhancement with new plantings, irrigation, culling out invasives, and advising the OV property manager. Mr. Barron was allowed to harvest OV sea oat seeds for germination and growth in his private nursery. The understanding was that OV would receive sea oat plants back in exchange for the seed culling, which would be advantageous to OV if a storm damaged existing sea oats on the dune system.

Today, the POA operating budget includes dune maintenance through its management company, First Services Residential. The OV Maintenance department, headed by Kenton Keltner, performs sea grape trimming in quarterly cycles, monitors irrigation, removes invasive species, maintains appropriate sand levels on the Crossover paths, and plants new sea oats and other species. CW Willis, the OV landscaping company, is consulted as necessary regarding dune plantings, sea oat seeds, and other aspects of dune flora that are not within the skill set of the FSR Maintenance staff.

It is anticipated that the POA Board of Directors leadership team will continue to direct funds to support the dune system as needed in the years to come on behalf of the OV ownership group. The POA operating budget has a line item under Repairs and Maintenance (item 70018) for beach and dune expenses which is currently allocated at $12,000 annually. The POA also has a Beach and Dune Reserve fund that has built up to $357,000; this fund is set aside to provide for devastating post-storm repairs.

The BDC advocates with the FSR maintenance team and the POA Board for the continual stability and health of the OV coastal dune system. One way the BDC does so is to review and update as necessary the OV Hurricane and Disaster Plan. This document describes recommended procedures for the FSR property management team and owners to take in the event of a devastating storm. The BDC helped to write the original document and reviews it biennially for updates and changes.

The BDC also composed a document titled, “Ocean Village Algal Bloom: Proposed Emergency Plan of Action.” This document focuses on possible sargassum buildup that could affect human health on the OV private beach if excessive. While the resources in this document have not been needed since it was written, summer sargassum growth has increased incrementally, and, so, the document may yet become of use.

In 2021, the BDC advocated for installation of an access mat at crossover #3. This mat allows individuals with physical disabilities to move up the ramp and across the sand to see and interact with the dunes, beach, and waves. Without the access mat, such an ability to enjoy the beach and dune system would be significantly restricted. Moreover, the access mat makes it easier for fishers to move their equipment onto the beach.

III. The Functional and Economic Interplay of the OV Dune System

Sand dunes offer ecosystem enhancements, including defense from surge and waves during storm events, habitat for wildlife, tourism and recreation, and carbon storage. As a highly dynamic natural feature, the OV dune system is constantly changing in response to erosion from storm events as well as recovery during calmer periods via wind- and wave-driven sediment transport.

Dunes serve a critical role in keeping communities safe from **coastal flooding.** The ocean is a powerful force that charges inland during wind-whipped storms, and oftentimes coastal dunes are the first line of defense. They fend off the advancing waves and prevent flood waters from reaching buildings, houses, roads, and other critical infrastructure located along the coastline. While damage from wind and storm surge on the east coast of Florida can be extreme, it is often worse for residents and businesses who do not have protection

from an initial storm barrier provided by dunes. The OV dunes provide natural coastal protection against storm surges and high waves and help prevent or reduce coastal flooding and structural damage to nearby properties.

A dune's ability to prevent flooding is determined in part by how sturdy it is. A healthy, natural dune is anchored in place by vegetation. As the dunes grow, they are colonized by deep-rooted plants. Additional organic materials accumulate and break down, so woody plants such as the saw palmetto, knickebean, beach rosemary, cabbage palm, and others become mature, further fixing nitrogen and strengthening the dune, so it has now become what is known as a scrub zone.

One of the most important functions of sand dunes is to prevent **beach erosion**. Erosion is the process by which water and wind wear away at the land. A strong and healthy beach dune is a powerful antidote against coastal erosion, acting as a barrier and protecting the land and built structure behind them. Without sand dunes, erosion would happen much more quickly.

With the changing earth's climate, scientists predict a change in frequency and intensity of coastal storms along the Atlantic coast, along with a rise in sea level. With a rise in sea level, storms and storm surges become more frequent and severe, with more areas prone to flooding and erosion. The dune system makes the OV coastal area more storm resilient. It should continue to lessen the impact storms have on the OV private beach and should help protect the OV property to its border with A1A.

Beach dunes are also a rich **habitat** for specific vegetation and wildlife. The diversity of dune shapes is also ideal for unique plants and animals to thrive, creating habitats that are internationally valued as special areas of conservation. Flowering plants, lizards, toads, and ground-nesting birds all call the dunes their home.

The OV beach is a pristine nesting ground for **sea turtles**, which are listed as a threatened species under the Endangered Species Act. Sea turtle nesting season in St. Lucie County runs from March 1 – November 15. Loggerhead, green, and leatherback turtles lay their eggs on the OV beach. With sea turtle populations threatened by climate change, ocean pollution, boat traffic, and beach erosion from storms and development, the BDC at OV advocates for the ownership group and the public to allow sea turtles to nest in peace.

For example, the nine-mile stretch of beach that begins at the Fort Pierce Inlet, crosses the OV beach, and continues on to Jensen Beach accumulated 5,500 loggerhead sea turtle nests in 2023, compared to the previous record of 4,400 nests. Officials counted 1,046 green sea turtle nests in this area, which was almost double previous years. This rate is linked to yearly alternating breeding cycles that sea turtles follow, making 2023 records an unexpected but welcomed surprise to scientists and the local community. The successful nesting numbers are partly attributed to years of conservation work and positive human impact. With more people living turtle friendly — picking up coastal trash and adhering to nesting season rules — sea turtles are drawn to the OV beach in greater numbers.

The dune system at OV also offers scenic beauty and is highly valued as a place of escape and isolation as well as a source of mental well-being. It safeguards a unique ecosystem and provides outdoor **recreational activities.** A healthy dune that protects and nurtures the OV private beach provides an ideal location for beachgoers and, so, attracts tourists and other visitors and should continue to do so for future generations. The beach at OV attracts single individuals and whole groups of people who sunbathe, make sand castles, collect shells, pick up litter, observe bird species, fish, swim, and surf.

Coastal dunes support biodiverse habitats of conservation interest and provide other essential but often overlooked benefits to OV such as **carbon storage**, thanks to their high soil carbon accumulation rates. Carbon storage refers to the stock of carbon trapped in ecosystems, particularly in their biomass and soil. The contribution of coastal dune herbaceous vegetation to carbon storage rate is important. As an early successional ecosystem, coastal dunes have a high soil carbon accumulation rate. Within the wider context of habitat management for multiple benefits, their role in regulating greenhouse gas emissions is quite valuable. Dune vegetation helps in absorbing and storing carbon dioxide, so the dune system acts as a carbon sink, absorbing and storing carbon dioxide

from the atmosphere. Additionally, the preservation and strengthening of natural coastal defenses, such as sand dune systems, plays an important role in increasing our coastal resilience to the impacts of climate change.

Section 7. Conclusion

The need for an integrated approach to the management of the Ocean Village coastal resources of beach and dune, given the uncertainties of climatic change and the other possible changes, made this report timely. The authors of this report recognized the need to develop a conceptual framework which embraced data, information, knowledge, and experience concerning our OV coastal system.

With at least 3 dozen plants identified on the OV dune, biodiversity within and among species and the diversity within and among ecosystems is strong and relatively self-sustaining. As a result, we authors feel strongly that appropriate proactive management of the OV coastal zone will be able to sustain its nature-based prosperity, even as challenges from the climate crisis present real obstacles.

This living document is important as a means of recording historical and current data about the beach and dune system at OV. It acknowledges best dune management practices while also becoming a reference for the larger community. Because the document is dynamic, the authors anticipate that it will need amending as the years go on due to climatic and social changes that affect it as an ecosystem and integral component of OV life.

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Glossary

Accretion: the process of growth or increase, typically by the gradual accumulation of additional layers or matter; in the case of OV, sand accumulation

Backdune: This is the part of the sand dune furthest from the coast, facing away from the ocean, separated from a foredune by a trough.

BDC: Beach and Dune Committee at Ocean Village

Coastal morphology: The study of the morphological development and evolution of the coast as it acts under the influence of winds, waves, currents, and sea level changes.

Crossovers: These are structures that provide visitors with access to the beaches while minimizing the impact on delicate coastal ecosystems. By creating designated pathways for beachgoers, the crossovers protect the dunes, vegetation, and wildlife habitats.

Ecosystem: An area where plants, animals, and other organisms, as well as weather and landscapes, work together to form a bubble of life.

Foredune: As part of a dune system, the foredune is located closest to the water body. Vegetation in the backshore plays an important role in the accumulation and retention of sand to form the dune ridge. Plant succession occurs as the dune develops.

Hopper dredge: Trailing suction hopper dredgers are self-propelled ships with hoppers, which are storage areas in the hull for keeping dredged material.

Indigenous: Occurring naturally in a particular place; native.

Littoral: Relating to or situated on the shore of the sea.

Morphology: The study of the forms of things.

OV: Ocean Village

POA: Property Owners Association

Qualitative analysis: The study of the nature of phenomena and is especially appropriate for answering questions of why something is or is not observed, assessing complex multi-component interventions, and focusing on intervention improvement.

"**R" monuments**: Coastal survey markers that, in Florida, mark key survey points along the sandy coastline.

Sand renourishment: The artificial placement of sand on an eroded shore to maintain the amount of sand present in the foundation of the coast; compensates for natural erosion and to a greater or lesser extent protects the area against storm surge.

Sustainable: Able to be maintained at a certain rate or level.

Swale: Ditches that blend in with surrounding landscape design, facilitate water management, and encourage natural irrigation.

Topography: The study of the forms and features of land surfaces.

Upland: High land especially at some distance from the sea.

USACE: United States Army Corp of Engineers.