



Village of Key Biscayne

88 West McIntyre Street • Key Biscayne, FL 33149

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SEAWEED MANAGEMENT ON OUR BEACH

Resilience and Sustainability

Seaweed and Seagrass Information

The Village receives many reports from residents in the summer about the increased accumulation of seaweed and seagrass along the Key Biscayne beach. Floating Sargassum seaweed (a drifting brown macroalgae) is transported from the Gulf of Mexico via the Loop Current to the Florida Straits, the Atlantic Ocean and Caribbean Sea. Local currents, winds and tides move the seaweed into the Key Biscayne area where it mixes with seagrass generated locally from the ocean bottom and is deposited along the beach at high tide.

Amounts of these naturally occurring organic deposits vary by season. Residents and visitors are advised to expect large quantities during the summer/early fall. Hurricane season, from June to November, is seaweed season as well. The volume and dune ward extent of the accumulations depends on the wave action/direction and is influenced by currents, the strength and direction of wind and by tidal effects. Higher winds from the NE, E and SE usually cause more seagrass, seaweed and other detritus to be deposited along the beach.

Mass accumulations of seaweed have affected Caribbean beaches since 2011 and indications are the deposits could increasingly affect South Florida beaches. The reasons behind these excess accumulations are being investigated by marine scientists, however, increased nutrient inputs to the coastal ocean at a continental scale and warming sea surface temperatures being driven by climate change are likely contributors to the overproduction of naturally occurring sargassum seaweed.

Sargassum and rooted seagrass that naturally die and drift onto the beach are important, natural components of our marine ecosystem. Both provide food and shelter for juvenile marine life and birds.

Routine Seaweed Control via Beach Cleaning Program

Beach Raker, the Village's beach maintenance contractor, mechanically cleans the beach within the Village limits seven days a week. Operations typically begin at approximately 6:00 a.m. and end around 10-11:00 a.m. depending on the beach conditions and how many people are on the beach. During turtle nesting season, however, the beach contractor must wait until the morning



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turtle nest survey has been completed before any work can commence. During turtle nesting season raking operations begin at approximately 7:30 a.m. and end around 11-11:30 a.m. The seaweed and seagrass are typically not hauled away but are buried at or below the mean highwater line (MHWL).

At times of high winds, high tides, and high seaweed accumulations, the Village beach contractor faces challenging conditions in that there is too much seaweed/seagrass to be fully buried. All the material may not be buried as a second tidal event occurs in the afternoon after morning work is completed. During these extreme conditions, the contractor is forced to haul the large quantities of organic material to a staging area where it is dried and then transported to a landfill for disposal. Additionally, during periods of extreme accumulation, the contractor may be asked to rake twice a day, hauling away part of the raked material and then burying the remainder. It should be noted that hauling away seaweed is very costly and each time seaweed is raked and hauled away, there is a negative impact to the beach due to associated sand loss, further contributing to the problem of beach "erosion".

Why Does the Village "Recycle" Seaweed and Seagrass?

Seaweed and seagrass are a vital part of the Village's beach ecosystem. The Village developed and implements a beach management plan in consultation with Moffatt and Nichol (previously Coastal Systems International), the Village's long-time beach management consultant. The process of integrating the seaweed back into the sand by burying it at or below the MHWL is a major factor in preventing beach erosion. This is not only an essential process but a methodical one. The objective is to maintain the original profile of the beach by burying the seaweed at the wrack line. Seaweed is not generally hauled off the beach because of the amount of sand that is also removed with the seaweed during the hauling process. This leads to beach erosion over time, since a component of the beach ecosystem is removed and not replaced. Also, the disposal costs of seaweed are extremely high and make this process financially impractical in the long term.

Burying seaweed along the beach helps keep several erosion "hotspots" from losing more sand. Our present beach profile shows that nearshore currents in front of Key Colony and Island House can be 2 to 10 times stronger than along the rest of the beach. The result is that more sand and seaweed are deposited at these locations than along the rest of the oceanfront. At the same time these currents take away, or erode, sand from the beach in front of the Silver Sands, resulting in



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a cove where the beach width is less than to the north or south. Erosion of sand is also more severe further south in front of the Ocean Club. The large quantities of seaweed brought onshore in the summer/early fall have been extremely beneficial in helping "rebuild" the cove in front of the Silver Sands and in reinforcing the dunes in front of the Ocean Club. The net effect widens the sandy beach at locations where natural processes erode the beach more than in other areas.

Upon occasion, seaweed can be placed at the frontal area of the dunes. This provides the dune with nutrients to the sea oats and other dune plants that make up a healthy dune system. The unique c-shape and rough texture of the grass-like sea oat fronds capture windblown sand and deposit it among the dune plants, further building up the amount of sand within the system.

A healthy dune system benefits the beach and the Village in many ways. Robust vegetated dunes absorb wave energy and protect upland property in tropical storm events and are a source of sand to the beach and nearshore areas after such events. Burying the seaweed on site removes the accumulations before they decompose and smell—and saves the Village money. Consistent removal of this material from the beach would incur hauling and disposal expenses that are not financially feasible.