

Final Order Adopting Port Everglades Inlet Management Plan

WHEREAS in 2008, the Florida Legislature amended Section 161.142, Florida Statutes, finding, “The Legislature recognizes the need for maintaining navigation inlets to promote commercial and recreational uses of our coastal waters and their resources. The Legislature further recognizes that inlets interrupt or alter the natural drift of beach-quality sand resources, which often results in these sand resources being deposited in nearshore areas or in the inlet channel, or in the inland waterway adjacent to the inlet, instead of providing natural nourishment to the adjacent eroding beaches. Accordingly, the Legislature finds it is in the public interest to replicate the natural drift of sand which is interrupted or altered by inlets to be replaced and for each level of government to undertake all reasonable efforts to maximize inlet sand bypassing to ensure that beach-quality sand is placed on adjacent eroding beaches. Such activities cannot make up for the historical sand deficits caused by inlets but shall be designed to balance the sediment budget of the inlet and adjacent beaches and extend the life of proximate beach restoration projects so that periodic nourishment is needed less frequently;” and

WHEREAS in 2004, the Department of Environmental Protection (Department or FDEP) and Broward County sponsored an inlet sand bypassing feasibility study of Port Everglades performed by Olsen Associates, Inc. (OAI), which compiled new and historical data and information regarding its coastal processes and inlet and shoreline dynamics, updated its sediment budget, and developed feasible alternatives for the mechanical transfer of sand from north of the inlet to the beaches south of the inlet; and

WHEREAS in 2007, OAI updated the inlet sand bypassing feasibility study for Port Everglades, which included recommendations for an inlet sand bypassing project; and

WHEREAS in 2014, OAI re-designed the sand trap and updated the engineering evaluation and cost analysis for the inlet sand bypassing project; and

WHEREAS, on February 3, 2017, the Department issued a final order authorizing Joint Coastal Permit No. 0289308-004-JC for the proposed inlet sand bypassing project; and

WHEREAS, on April 2018, the Department developed an updated inlet management plan that contains corrective measures to mitigate the identified inlet erosion impacts to adjacent beaches; and

WHEREAS, Broward County and the U.S. Army Corps of Engineers are the entities responsible for dredging at Port Everglades, and therefore, responsible for implementation of the inlet management plan; and

WHEREAS, this inlet management plan (attached) is consistent with the Department's program objectives under Chapter 161, Florida Statutes,

THEREFORE:

The Department does hereby adopt the following implementation strategies, as set forth in the attached **Port Everglades Inlet Management Plan**. Future inlet management activities shall be consistent with the following four strategies:

- 1) **A comprehensive beach and inlet hydrographic monitoring program** shall be conducted to evaluate the performance and impact of existing sand bypassing and nourishment projects and to periodically update the inlet sediment budget.
- 2) **Sand bypassing shall be performed from the Port Everglades navigation channel and sand trap to the adjacent ocean-fronting beaches to the south of the inlet between FDEP Reference Monuments R86 and R92.** The quantity of fill to be placed shall be based on observed beach erosion patterns and sand trap and navigation channel deposition quantities documented through the monitoring protocol of Strategy #1 above.
- 3) **On an average annual basis, the initial target inlet sand bypassing quantity shall be 41,700 cubic yards per year.** This target quantity may be modified or updated based on a minimum of four years or more of monitoring data indicating a change in the sediment budget. In the interim, should the volume of sand accumulating in the Port Everglades navigation channel and sand trap exceed these quantities, the additional sand may be dredged and placed on the adjacent beaches.
- 4) **The source of sediment for meeting the target sand bypassing quantities in Strategy #3 above shall be the Port Everglades navigation channel and sand trap.** Acceptable beach quality sand may also be obtained from inland sand mines or offshore sources to supplement the target sand bypassing quantities.

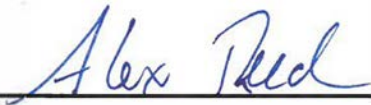
Inlet management actions that implement the strategies contained in this plan are subject to further evaluation, and subsequent authorization or denial, as part of the Department's permitting process.

Activities that implement these adopted strategies shall be eligible for state financial participation pursuant to Section 161.143, Florida Statutes, subject to Department approval and an appropriation from the Florida Legislature. The level of State funding shall be determined based on the activity being conducted and the Department's rules. The Department may choose not to participate financially if the proposed method of implementation is not cost effective or fails to meet the intent of Section 161.142, Florida Statutes, and this final order. Nothing in this plan precludes the evaluation and potential adoption of other strategies for the effective management of Port Everglades and the adjacent beaches.

Execution of this Final Order constitutes agency action. Any Florida corporation not for profit which meets the requirements of Subsection 403.412(6), Florida Statutes, and any person whose substantial interests will be determined or affected by the Final Order may petition the Department for a formal or informal administrative hearing pursuant to Section 120.569 or 120.57, Florida Statutes, as set forth in the attached Notice of Rights, to challenge the provisions of this Final Order.

If the Department proposes to issue a permit that implements the strategies in this Final Order, any Florida corporation not for profit which meets the requirements of Subsection 403.412(6), Florida Statutes, and any person whose substantial interests will be determined or affected by the proposed permit may petition the Department for a formal or informal administrative hearing pursuant to Section 120.569 or 120.57, Florida Statutes, as set forth in the Notice of Rights attached to the permit. The scope of a challenge to a permit approval or denial is limited to whether the agency action complies with the permitting criteria. Agency action previously subject to challenge or administrative review will not be subject to challenge at the time of permit approval or denial.

Approval of Adoption



Alex Reed

Director of Division of Water Resource Management
Florida Department of Environmental Protection

Filing and Acknowledgement

FILED, on this date with the designated Department Clerk, pursuant to
Section 120.52, F.S., receipt of which is hereby acknowledged.



Deputy Clerk



Date

Notice of Rights

The Department's proposed agency action shall become final unless a timely petition for an administrative hearing is filed under Sections 120.569 and 120.57, Florida Statutes, before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the Department's proposed action decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received by the clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000. Petitions must be filed within twenty-one days of receipt of this written notice.

Under Rule 62-110.106(4), Florida Administrative Code, a person whose substantial interests are affected by the Department's action may request an extension of time to file a petition for an administrative hearing. Requests for extension of time must be filed (received by the clerk) with the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, before the end of the time period for filing a petition for an administrative hearing. The Department may, for good cause shown, grant the request for an extension of time. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon.

Petitions filed by anyone other than those entitled to written notice under Section 120.60(3), Florida Statutes, must be filed within twenty-one days of publication of the notice or within twenty-one days of receipt of the written notice, whichever occurs first. Under Section 120.60(3), Florida Statutes, however, any person who asked the Department for notice of agency action may file a petition within twenty-one days of receipt of such notice, regardless of the date of publication.

The failure of any person to file a petition or request for extension of time within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, Florida Statutes, or to intervene in this proceeding and participate as a party to it. Any subsequent intervention (in a proceeding initiated by another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, Florida Administrative Code.

A petition that disputes the material facts on which the Department's action is based must contain the following information:

- (a) The name and address of each agency affected and each agency's file or identification number, if known;
- (b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests are or will be affected by the agency determination;
- (c) A statement of when and how the petitioner received notice of the agency decision;
- (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
- (e) A concise statement of the ultimate facts alleged, including the specific facts that the petitioner contends warrant reversal or modification of the agency's proposed action;
- (f) A statement of the specific rules or statutes that the petitioner contends require reversal or modification of the agency's proposed action; and
- (g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wishes the agency to take with respect to the agency's proposed action.

A petition that does not dispute the material facts on which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301, Florida Administrative Code.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

Mediation under Section 120.573, Florida Statutes, is not available.

Once this decision becomes final, any party to the final agency action has the right to seek judicial review of it under Section 120.68, Florida Statutes, by filing a notice of appeal under Rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department in the Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000, and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within thirty days after this decision is filed with the clerk of the Department.

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Introduction

Pursuant to Subsection 161.101(2), Florida Statutes, the Florida Department of Environmental Protection (Department or FDEP) is the beach and shore preservation authority for the State of Florida. As part of the Department’s statewide beach management plan adopted pursuant to Section 161.161, Florida Statutes, the Department is adopting this inlet management plan for Port Everglades in Broward County, Florida.

Port Everglades Inlet Management Plan updates strategies for Port Everglades that were adopted in the *Port Everglades Inlet Management Study Implementation Plan* (May 3, 1999) and the *Strategic Beach Management Plan* (FDEP, 2018) to be consistent with current statutes and observed erosion¹ conditions. Implementation action #4 of the *Port Everglades Inlet Management Study Implementation Plan* (FDEP, 1999) called for a feasibility study to determine the impacts of construction of a breakwater and spur structure on the south jetty, a weir on the north jetty or other alternatives to facilitate mechanical bypassing of sand, including the removal of rock rubble located north of the inlet. The Department and Broward County sponsored a sand bypassing feasibility study of Port Everglades in 2004 that was performed by Olsen Associates, Inc. (OAI).

Program Objectives and Statutory Responsibilities for Inlet Management

In 2008, the Florida Legislature amended Section 161.142, Florida Statutes, finding,

“The Legislature recognizes the need for maintaining navigation inlets to promote commercial and recreational uses of our coastal waters and their resources. The Legislature further recognizes that inlets interrupt or alter the natural drift of beach-quality sand resources, which often results in these sand resources being deposited in nearshore areas or in the inlet channel, or in the inland waterway adjacent to the inlet, instead of providing natural nourishment to the adjacent eroding beaches. Accordingly, the Legislature finds it is in the public interest to replicate the natural drift of sand which is interrupted or altered by inlets to be replaced and for each level of government to undertake all reasonable efforts to maximize inlet sand bypassing to ensure that beach-quality sand is placed on adjacent eroding beaches. Such activities cannot make up for the historical sand deficits caused by

¹ As used in this document, the term “erosion” means wearing away of land or the removal of consolidated or unconsolidated material from the coastal system by wind or wave action, storm surge, tidal or littoral currents or surface water runoff. As used in this document, the term “accretion” means the buildup of land or accumulation of unconsolidated material within the coastal system caused by wind and wave action, storm surge, or tidal or littoral currents. The descriptions of coastal processes in this document are not intended to affect title to real property or real property boundaries.

inlets but shall be designed to balance the sediment budget of the inlet and adjacent beaches and extend the life of proximate beach restoration projects so that periodic nourishment is needed less frequently.”

Pursuant to Section 161.143, Florida Statutes,

“Studies, projects and activities for the purpose of mitigating the erosive effects of inlets and balancing the sediment budget on the inlet and adjacent beaches must be supported by separately approved inlet management plans or inlet components of the statewide comprehensive beach management plan.”

The U.S. Army Corps of Engineers (USACE) and Broward County have been the entities responsible for maintenance dredging Port Everglades and consequently, mitigating the extent of beach erosion caused by the inlet, as specified in Subsection 161.142 (6), Florida Statutes.

History of Port Everglades (Marino and Mehta, 1986; CTC, 1988)

Port Everglades is a man-made inlet in Broward County on the southeast coast of Florida connecting the Straits of Florida with an interior deep-water port basin, the Atlantic Intracoastal Waterway, and numerous residential canals (Figure 1). Port Everglades is bounded on the north by Ft. Lauderdale and on the south by Dr. Von D. Mizell-Eula Johnson State Park. It is important to understand the history of Port Everglades, its evolution and prior inlet management activities, and beach erosion control activities along the adjacent beaches, to gain a perspective on the inlet's dynamics and the need to change inlet management strategies over time.

Historical records indicate local interests initiated construction and excavation of Port Everglades in 1926 and completed the initial project in 1928, which included the construction of two steel sheet pile cellular jetties, steel bulkheads along the inlet shorelines, and five steel groins south of the inlet (Figure 2). Previously, a small jettied inlet called New River Inlet had been open about 5,500 feet to the north, but immediately following construction of Port Everglades, it closed. The New River Inlet jetties were not removed and have since become substantially buried by the beach.

Port Everglades was adopted as a federal navigation project in 1930, and the initial project was constructed in 1931, which included the excavation of 108,300 cubic yards of material, and the construction of two entrance jetties of native limestone. The navigation project included an entrance channel that is 7,300 feet long by 210 feet wide, an entrance basin, a turning basin 1,200 feet square, and slip 1,200 feet long and 300 feet wide. The channel and basin were dredged to a project depth of 35 feet. Maintenance dredging projects took place in 1935 and 1939.

The first port improvement project took place in 1940 and included widening the seaward end of the entrance channel to 500 feet and tapering to 300 feet within the jetty entrance. The turning basin was also enlarged by adding a trapezoidal area 350 feet wide on the north side. Approximately 1.8 million cubic yards of material was excavated for this port and navigation channel improvement project. The inlet jetties were also re-built using granite boulders. Over the next 20 years the project had five maintenance dredging projects (Table 1).

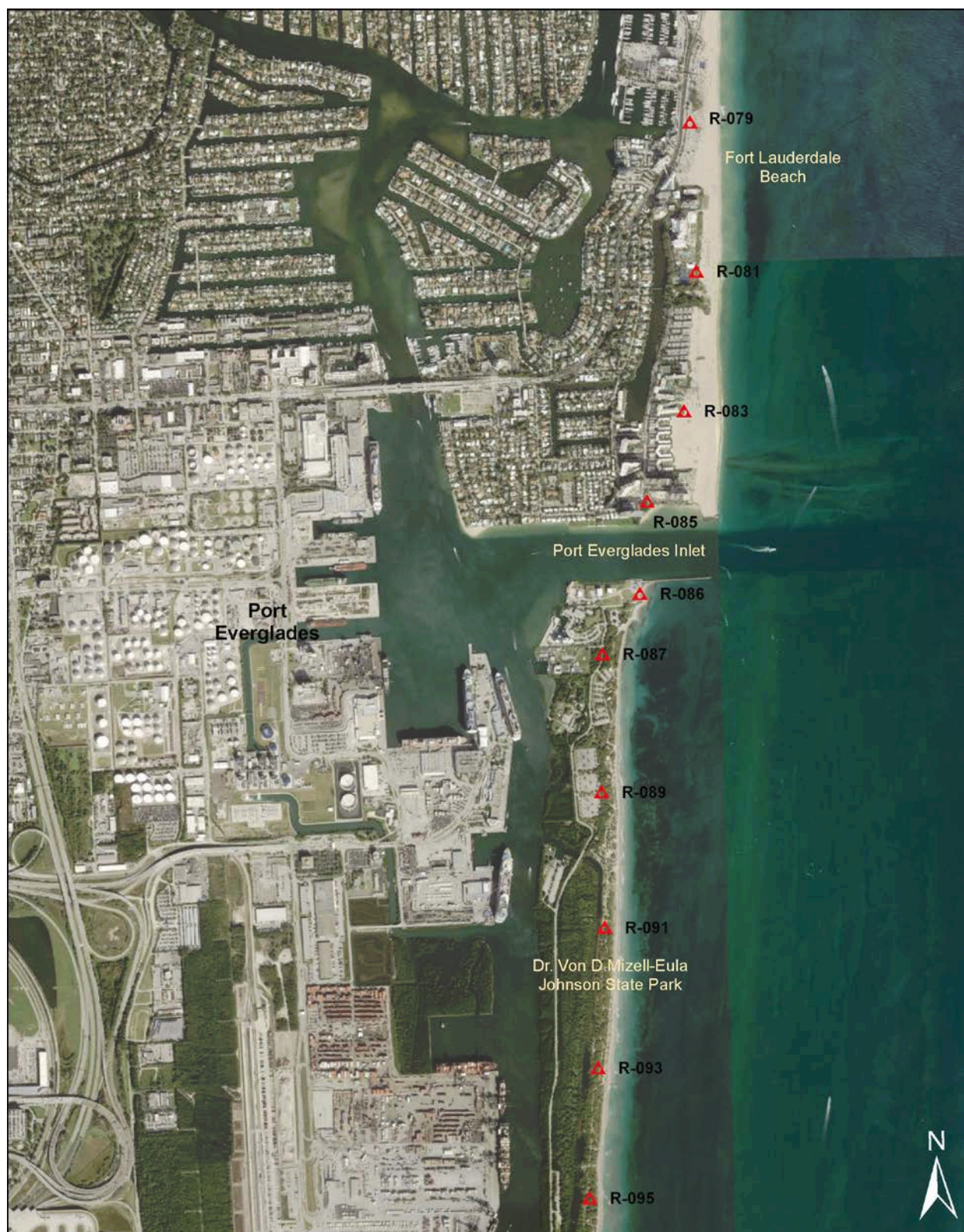


Figure 1. Port Everglades in Broward County, FL (ESRI Image 2015).



Figure 2. Historic 1928 image looking north over Port Everglades Inlet (Lake Mabel) in Broward County, FL (Image from the Florida State Archives - Florida Memory Project.)

In 1962, a second port improvement project took place, which included deepening the entrance channel to 40 feet and the interior channel and basin to 37 feet. Approximately 729,000 cubic yards of material was excavated, which was substantially comprised of limestone rubble and sediment. This material was disposed to the north of the channel and approximately 2,000 feet offshore. Much of this material has migrated landward.

The third port improvement project was completed in 1984, but dredging and jetty realignment took place in 1980. The seaward 180 feet of the north jetty was removed from its northwest to southeast alignment and a new east-west aligned segment was constructed to be parallel to the channel. The entrance channel was deepened to 47 feet with a 500-foot bottom channel width from the seaward end to just inside the jetties. The inner channel was deepened to 45 feet plus an allowable 4-foot over depth and widened from the jetties to the turning basin to a bottom width of 450 feet. In addition, the turning basin was deepened to 42 feet plus an allowable 4-foot over depth and was extended 200 feet to the southeast. Approximately 1.5 million cubic yards of material was removed with this project.

In 1988, a south jetty rehabilitation project was conducted by filling voids with a sodium silicate-cement sealant to mitigate sand losses into the channel from the beach to the south (Rosati and Denes,

1990). The fourth port improvement project was completed in 1992 and included the excavation of a south turning notch and deepening/widening the Atlantic Intracoastal Waterway immediately to the south of the turning basin. Approximately 840,000 cubic yards were removed for this project.

Table 1. Port Everglades Channel dredging history from 1931 to 2017.

Year	Volume (cy)	Deposition Location
1931	108,300	Unknown
1935	170,500	Offshore
1935	73,100	Upland
1939	48,300	Upland
1940	1,800,000	Unknown
1948	93,900	Upland
1948	206,300	Offshore
1950	47,300	Upland
1953	179,800	Upland
1953	97,300	Offshore
1954	101,200	Upland
1960	142,600	Upland
1960	38,700	Offshore
1961-62	9,600	Upland
1961-62	12,200	Beach
1961-62	22,500	Ocean/Beach
1962	729,000	2,000 feet offshore & north of channel

Year	Volume (cy)	Deposition Location
1978	144,500	Beach
1980-84	1,500,000	Offshore
1992	840,000	Offshore
2005/6	44,200	Beach
2013	116,000	Beach

In 2005/2006, two boulder mound T-groins and one jetty spur groin were constructed immediately south of the south jetty for 700 feet. The federal navigation channel was dredged, and the beach compatible material was placed on the state park beach to the south. In 2013, another navigation channel maintenance project placed additional beach quality sand on the state park beach.

On February 3, 2017, the Port Everglades Sand Bypassing Project was authorized by the Department (Joint Coastal Permit #0289308-004-JC). The project is to construct a sediment impoundment basin and rigid coastal structures (Figure 3). Prior to construction of the impoundment basin, the landward end of the rubble spoil shoal (approximately 1,130 feet in length) from the 1962 port improvement project, will be excavated to remove non-beach compatible material and to re-expose a portion of a buried hardbottom.

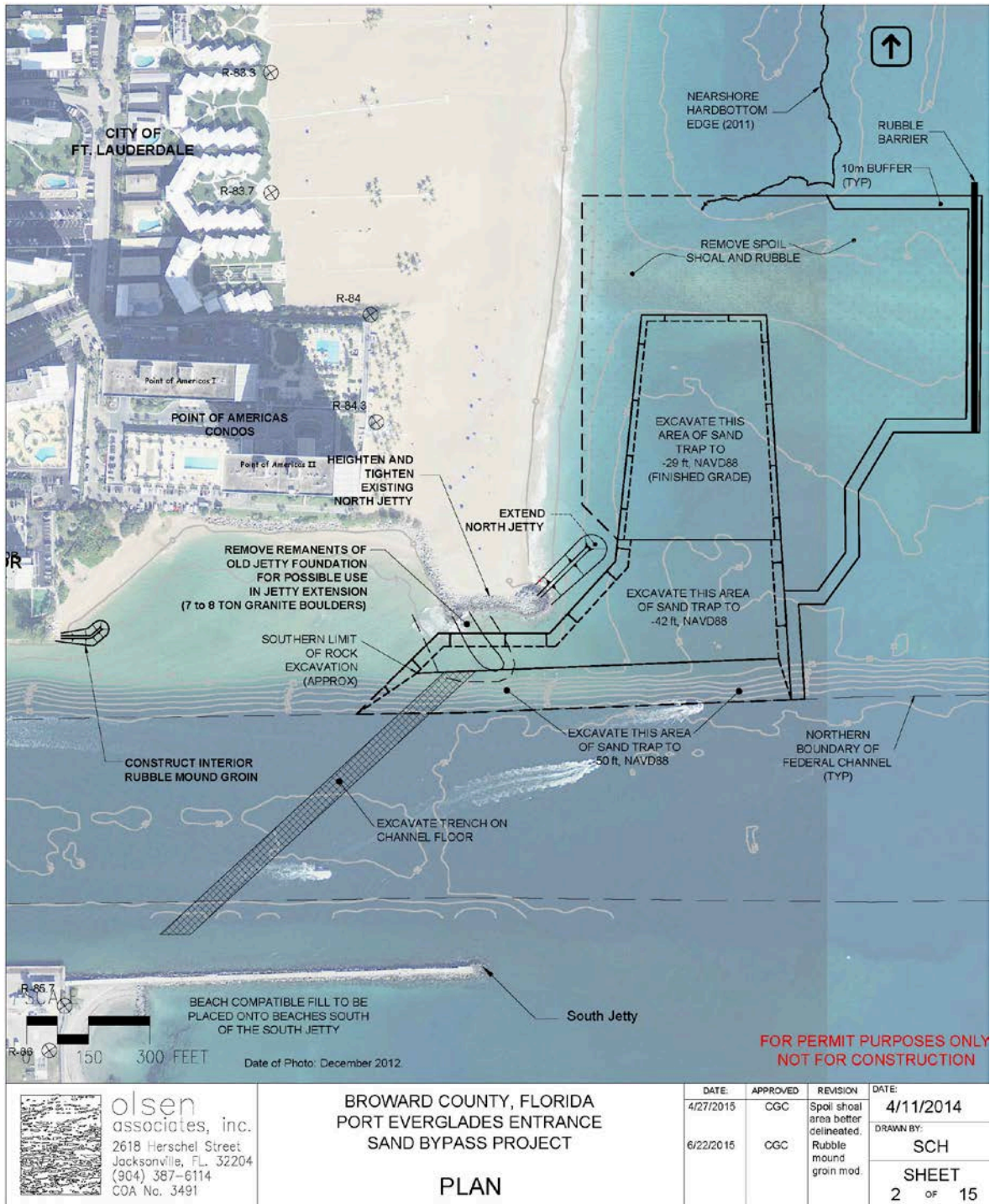


Figure 3. The authorized sand bypassing project (Joint Coastal Permit #0289308-004-JC) with sand trap, jetty modification, and rubble spoil shoal removal design (OAI, 2014). Aerial image taken in 2012.

The sediment impoundment basin will be approximately 10.8 acres in size and will be constructed to depths ranging from -29 feet NAVD at the northernmost section, -42 feet NAVD in the central section, and -50 feet NAVD at the southern end, where the basin connects to the federal navigation channel. An

80-foot wide portion of the limestone bedrock, between the central and southern sections of the basin, will remain at an elevation of -20 feet NAVD, to serve as a sill to retain sand in the central section of the basin. A submerged mounded boulder barrier measuring 577 feet long by 16 feet wide, with a maximum crest elevation of -6 feet NAVD, will be constructed along the eastern edge of the rubble shoal excavation area to prevent the unexcavated portion of the rubble shoal from spreading westward onto the newly exposed hardbottom or the sediment impoundment basin. The project also includes other rigid coastal structures: the granite boulder mound north jetty of the inlet will be sand-tightened and raised to a maximum elevation to +9 feet NAVD; the north jetty will be extended approximately 160 feet towards the northeast; and a 105-foot long boulder mound groin will be constructed at the western end of the inlet shoreline beach with a maximum elevation of +6 feet NAVD.

Inlet Management Studies (USACE, 1963; CP&E, 1985; CTC, 1988; CTC, 1994; CSI, 1997)

Since the 1960's, inlet management studies have investigated the feasibility of implementing sand bypassing from north of the inlet to the south. Due to the existence of the rock rubble shoal north of the inlet created by the harbor deepening project in 1962, very little material enters the navigation channel from the north, which could be dredged and bypassed to the south. In 1963, the USACE estimated the southward net longshore transport to be approximately 50,000 cubic yards per year and determined that this quantity was insufficient to justify the cost of a sand bypassing operation (USACE, 1963). The cost of bypassing was compared with the lower cost of dredging offshore and nourishment of the beaches south of Port Everglades. The diminishing supply of offshore sand resources was not considered.

In 1985, Coastal Planning and Engineering, Inc. investigated alternate sand sources for beach nourishment in Broward County, and evaluated different sand bypassing alternatives for Port Everglades (CP&E, 1985). Based on 1984 shoreline conditions, this study recommended the construction of a weir in the north jetty and the placement of four jet pumps inside the weir to continually bypass to the south an annual quantity of 34,000 cubic yards of sand. Not considered was the effects of the rubble spoil shoal and its impoundment of the littoral drift of sand from the north.

Broward County funded a follow-up sand bypassing study by Coastal Technology Corporation (CTC, 1988). This study updated the inlet sediment budget and considered the effects of the rubble spoil shoal on sand impoundment and shoreline change. The study evaluated six bypassing alternatives and

compared the costs of implementing them. Bypassing was recommended as feasible, but specific bypassing details were not developed.

In 1994, CTC conducted additional study and developed a local inlet management plan for Port Everglades. The study evaluated and compared eight alternative sand bypassing concepts. Due to the low rate of sand transport into sand collection areas, sand bypassing was not determined to be more economical than the continued regular nourishment of the beaches south of the inlet by the USACE's recommended Broward County Segment III Shore Protection Project as federally approved in October 1992. CTC (1994) did express concern for the diminishing supply of beach quality sand offshore, and recommended planning for the installation of a sand trap for mechanical sand bypassing.

An addendum to the local inlet management plan was developed for Port Everglades by Coastal Systems International (CSI, 1997). Two of the sand bypassing alternatives proposed by CTC (1994) were evaluated in greater detail and an updated sediment budget was developed with the most recent data. It was concluded that the most efficient and cost-effective bypassing plan would be to construct a weir in the north jetty with an interior sand trap to be dredged every two years.

Adopted Inlet Management Plan – 1999 (FDEP, 1999)

Based upon supporting data from the inlet management study of 1994 and the addendum of 1997, along with studies of the USACE, and comments from stakeholders in Broward County, the Department adopted the Port Everglades Inlet Management Study Implementation Plan on May 3, 1999. Property owners north of Port Everglades expressed concerns for the effects of constructing a north jetty weir and sand trap on shoreline stability and potential foundation and structural impacts to an adjacent condominium. The adopted inlet management plan set forth the following strategies –

- Place all beach compatible maintenance or offshore dredge material on downdrift beaches in areas of greatest need. The combined total of material from all sources shall equal or exceed 44,000 cubic yards on an average annual basis.
- The sediment budget contained in the study report is adopted as an interim measure and shall be formally validated or redefined in subsequent revisions of the plan based on a comprehensive monitoring plan by December 31, 2002.
- Implement a comprehensive inlet, beach and offshore monitoring program subject to approval by the Department.

- Conduct a feasibility study to determine the impacts of the construction of a breakwater and spur structure on the south jetty, a weir on the north jetty or other alternatives to facilitate mechanical bypassing of sand. The study should consider the removal of the rock rubble located north of the inlet.

Since the plan's adoption, all beach compatible channel maintenance dredge material has been placed on the state park beach south of Port Everglades. A total of 160,200 cubic yards has been bypassed from the channel to the south. This represents a substantial shortfall in the target quantity of material bypassed. However, nourishment of Segment III of the Broward County Shore Protection Project contributed 550,000 cubic yards of material to the state park beach south of Port Everglades (R86-R92), resulting in a total volume of sand placed, including bypassing, of 710,200 cubic yards. For the last 17 years since adoption of the inlet management plan, this represents approximately 41,800 cubic yards per year, which is a figure less than the adopted plan's recommended 44,000 cubic yards per year, but comparable to the recommended updated target bypassing figure of 41,700 cubic yards per year.

In response to Strategy 4 of the adopted plan, a feasibility study was conducted (OAI, 2004). A south jetty spur and two boulder mound T-groins were constructed in 2005/2006. OAI (2004) recommended partial removal of the rubble shoal north of the inlet and developed three potential bypassing alternatives for further analysis.

Inlet Management Studies of 2004, 2007, and 2014

OAI (2004) presented detailed analyses of beach, shoreline, and inlet survey data between 1980 and 2001. The study included comprehensive wave, current, sediment transport and shoreline change modeling, a field survey of tides, currents and nearshore bed conditions, and evaluation of environmental and socio-economic conditions. An inlet sediment budget was developed for existing conditions as well as several sand bypassing project alternatives. Three potentially feasible alternatives were developed in this Phase I study and removal of the landward portion of the rubble shoal was determined necessary for any bypassing plan to be feasible.

In the Phase II study, OAI (2007) obtained additional shoreline surveys and navigation channel surveys through 2006, which enabled an updated sediment budget to be developed. Of the three sand bypassing alternatives developed in the Phase I study, the Department and Broward County recommended two for further study. In addition, two new alternatives were also developed for further study. The investigation of the four alternatives evaluated the effects of the north jetty modifications and sand trap on the

adjacent shoreline and structures north of the inlet. The study determined that Alternative 4 was the most feasible and acceptable with regard to sand bypassing potential and impacts to the adjacent shoreline and development. Alternative 4 involved modification of the rubble spoil shoal, sand tightening and raising the elevation of the existing north jetty, constructing a low-crested extension to the north jetty, and excavation of a sand trap to -45 feet (NGVD) seaward of the jetty extension.

Broward County prepared an application in 2008 for a Joint Coastal Permit from the Department to sand-tighten and extend the existing north jetty, remove a portion of the rubble spoil shoal located about 1,000 feet north of the inlet, and dredge a sand trap located between the inlet channel and a line projecting seaward of the southern boundary of the Point of Americas condominium. The sand trap was to be excavated to a uniform depth of -49 feet NAVD to meet the required sand storage capacity for up to four years of longshore transport from the north. Geotechnical investigations determined the presence of very hard rock at elevations between -38 and -42 feet NAVD, which would require pre-treatment in the form of controlled underwater blasting. Following considerable opposition from stakeholders north of the inlet, it was suggested that the sand trap undergo a redesign for a shallower depth with a greater spatial coverage extending northward in front of the Point of Americas property. In 2013, Broward County withdrew its state and federal permit applications, and initiated a sand trap redesign based on expanded geotechnical data coverage. The redesign analysis considered the following conditions:

- Bottom elevations in the trap should be sited above rock that would require pre-treatment or specialized equipment for removal.
- Sand trap capacity should provide for a 3 to 4-year maintenance cycle.
- Effects to the shoreline and navigation project should be considered, avoided and/or minimized.
- Construction excavation should not exceed 500,000 cubic yards. This ensures the ability to use the Offshore Dredge Material Disposal Site (ODMDS) for non-beach compatible dredge material. Beach compatible material would be placed on the adjacent beach.
- The spoil shoal removal should be modified to accommodate efficient sand transport to the sand trap.
- Construct a pipeline trench across the navigation inlet floor.

Updated Sediment Budget (OAI, 2004; OAI, 2007; OAI, 2014)

Pursuant to Section 161.142, Florida Statutes, dredging within an inlet system, including its shoals, should result in the placement of all beach quality sand on adjacent eroding beaches to balance the

sediment budget between the inlet and adjacent beaches. A sediment budget is a balance of the volumes (or volume rate of change) for sediments entering and leaving a tidal inlet system and its adjacent beaches. A sediment budget quantifies the natural longshore sediment transport by waves and tides to and from the inlet, the entrapment of longshore sediment by the inlet channel and the ebb and flood shoals, and the mechanical “bypassing” of sediment, typically by a hydraulic dredge, from the inlet to the adjacent beaches or nearshore. Sediment transport volumes and pathways are unique to each inlet as influenced by regional geology, morphological characteristics, wave and tide conditions, and sediment characteristics and supply. A sediment budget is determined by comparing two or more surveys of an inlet system, including its channel, ebb and flood shoals, and the adjacent beaches.

The 2004 inlet management study for Port Everglades developed a general sediment budget for the time period 1979 to 2001. This sediment budget used values of transport coefficients and transport ratios that were most representative of typical conditions and covered a segment of coast extending approximately 1.5 miles (8,000 feet) north and south of the inlet. With this sediment budget, the beach segment south of the inlet lost -41,000 cubic yards of sand per year. Because sand bypassing does not occur across the entrance channel, the sediment budget is represented by two uncoupled budgets for the shorelines north and south of the inlet. Principle assumptions were the following:

- The littoral transport across the inlet is zero.
- Mechanical dredging of material captured by the inlet does not regularly occur and did not occur during the period covered in the sediment budget.
- Net sand influx from interior waters and from offshore sources is negligible.

The 2007 inlet management study for Port Everglades updates the sediment budget with a survey for February 2006. With this update sediment budget, the beach segment to the south of the inlet lost - 48,500 cubic yards of sand per year; however, this budget included the hurricanes of 2004 (Frances and Jeanne) and 2005 (Katrina and Wilma). With the sand trap redesign investigation of 2014, the sediment budget was updated once again for the period 1979 to 2011 (Figure 4).

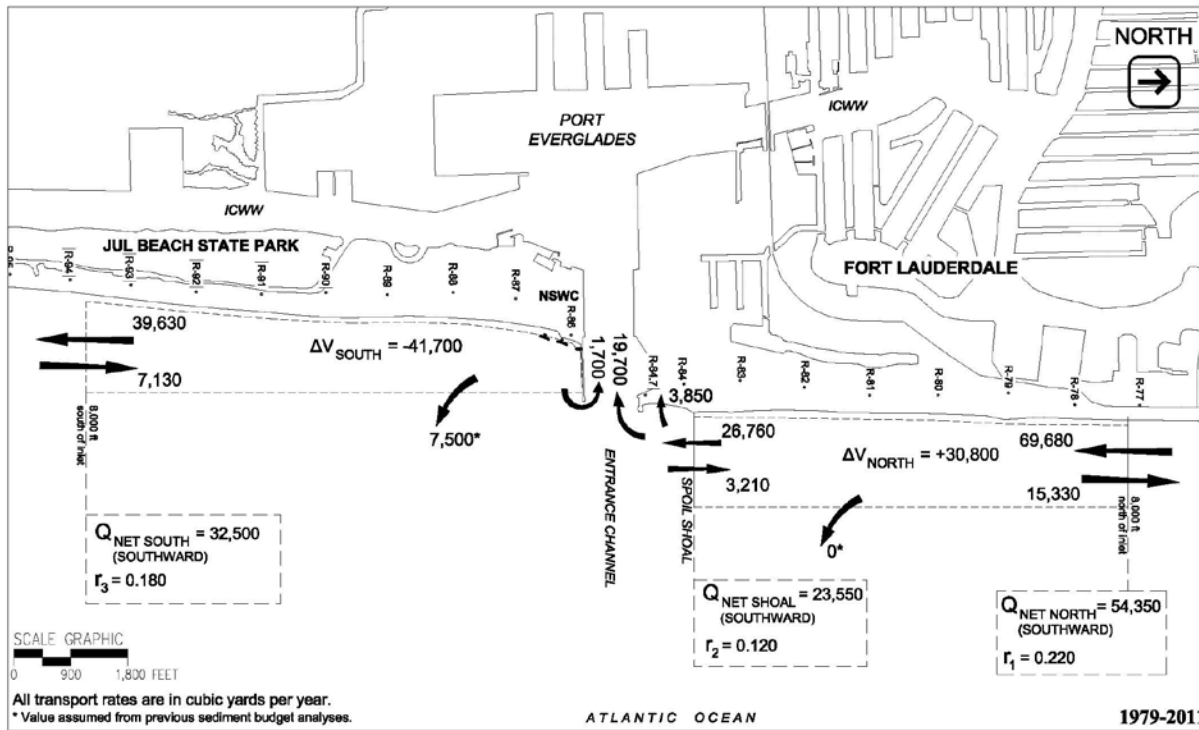


Figure 4. Port Everglades inlet sediment budget based upon beach and inlet volume change data 1979-2011. Units are cubic yards per year. (OAI, 2014)

With this updated sediment budget, the beach segment to the south of the inlet lost -41,700 cubic yards of sand per year, which was consistent with the sediment budget of 2001 that was not immediately after three hurricanes. Consistent with the 2006 sediment budget, this 2011 sediment budget predicts sand transport patterns north of the inlet between 40,000 and 60,000 cubic yards per year of material that may be available for transport to the sand trap. A sediment budget using the data for 1979 to 2011 was subsequently developed for projected conditions following construction of the re-designed sand trap and bypassing project (Figure 5). The proposed addition of 46,000 cubic yards bypassed to the south will relieve the existing shoreline deficit of -41,700 cubic yards and provide a residual volume for potential transport to the south.

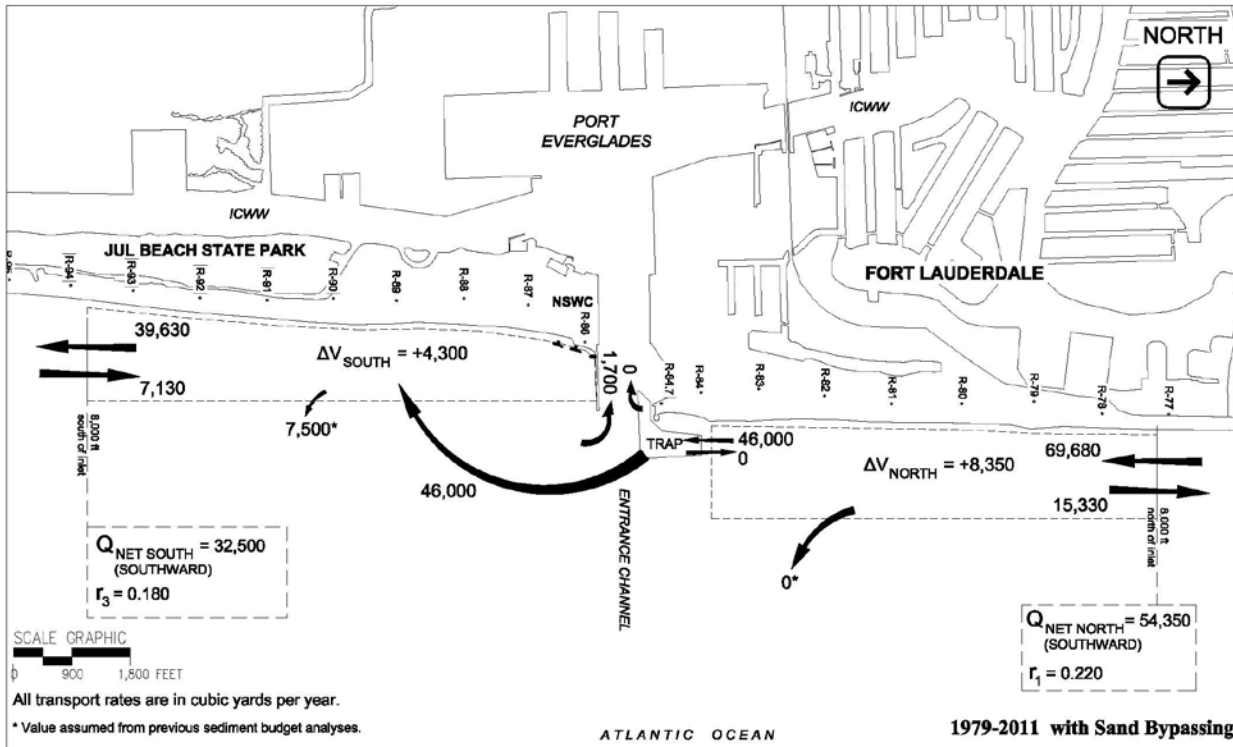


Figure 5. Sediment budget updated for with-project conditions using data for the period 1979-2011. Units are cubic yards per year. (OAI, 2014)

Recommended Inlet Management Plan Strategies

The Department staff recommends the following inlet management strategies be adopted to meet the requirements of Chapter 161, Florida Statutes. Future inlet management activities shall be consistent with the following four strategies.

- 1) **A comprehensive beach and inlet hydrographic monitoring program shall be conducted to evaluate the performance and impact of existing sand bypassing and nourishment projects and to periodically update the inlet sediment budget.**

Discussion – A comprehensive beach and inlet hydrographic monitoring program is the most important element to manage the sediment at Port Everglades. Topographic and bathymetric surveys provide reliable data to estimate the volumetric impact of the inlet on adjacent beaches and to establish a sand placement protocol that complies with Section 161.142, Florida Statutes. The current approved inlet monitoring program conducted by Broward County provides sufficient monitoring data.

- 2) **Sand bypassing shall be performed from the Port Everglades navigation channel and sand trap to the adjacent ocean-fronting beaches to the south of the inlet between FDEP**

Reference Monuments R86 and R92. The quantity of fill to be placed shall be based on observed beach erosion patterns and sand trap and navigation channel deposition quantities documented through the monitoring protocol of Strategy #1 above.

Discussion – The Dr. Von D. Mizell – Eula Johnson State Park south of Port Everglades is the beach erosion area directly impacted by Port Everglades. The beaches 8.1 miles to the south of Port Everglades (R86-R128) are currently designated critically eroded by the Department (FDEP, 2017).

- 3) On an average annual basis, the initial target inlet sand bypassing quantity shall be 41,700 cubic yards per year.** This target quantity may be modified or updated based on a minimum of four years or more of monitoring data indicating a change in the sediment budget. In the interim, should the volume of sand accumulating in the Port Everglades navigation channel and sand trap exceed these quantities, the additional sand may be dredged and placed on the adjacent beaches.

Discussion – The sediment budget indicates a need to place a total of 41,700 cubic yards of sand per year on the eroded beaches south of the inlet. The authorized project proposes the placement of 46,000 cubic yards of sand per year, which will exceed the target quantity needed within the state park and allow a residual quantity for potential transport to the south.

- 4) The source of sediment for meeting the target sand bypassing quantities in Strategy #3 above shall be the Port Everglades navigation channel and sand trap.** Acceptable beach quality sand may also be obtained from inland sand mines or offshore sources if necessary to supplement the target sand bypassing quantities.

Discussion – The area dredged for sand bypassing is the Port Everglades navigation channel and authorized sand trap. This does not exclude acceptable quality sand obtained from inland sand mines or offshore sources when determined necessary to supplement or facilitate the target sand bypassing quantities.

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