Jupiter/Carlin Nourishment

A Case of Adaptive Management, Cooperation and Innovative Applications

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National Conference on Beach Preservation Technology

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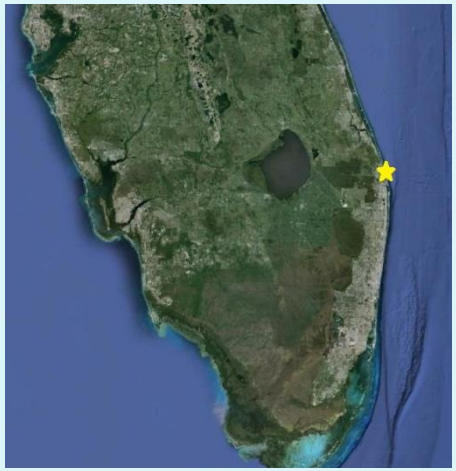
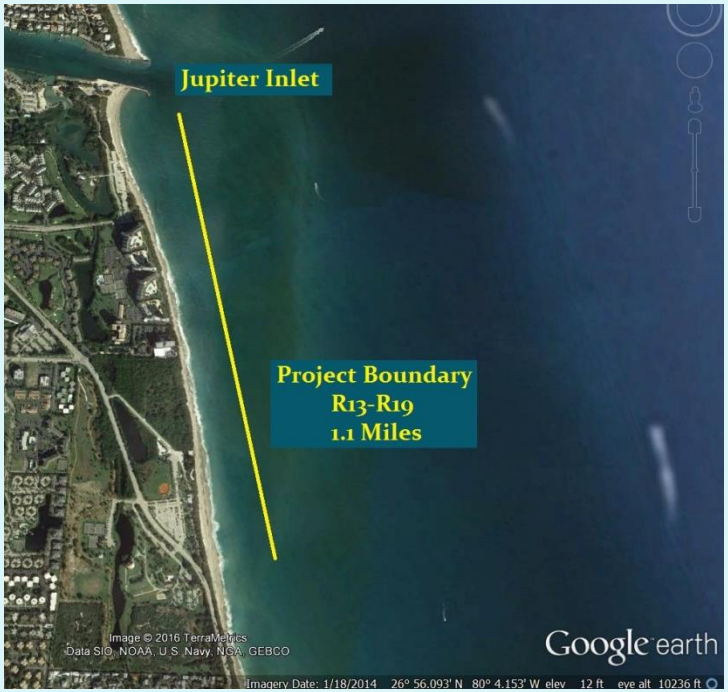
Jupiter/Carlin Nourishment

Project Overview



- 1.1 mile length of shoreline immediately south of the Jupiter Inlet (R13-R19)

- Initially constructed in 1995, re-nourished in 2002



- 2nd re-nourishment 2015
  - Planned/permitted as a 822,000 CY dredge and fill utilizing an offshore borrow area
  - Built utilizing 467,300 CY from multiple sand sources
    - PBC – Truck Haul
    - USACE – FCCE
    - JID – Inlet Sand Trap Dredging

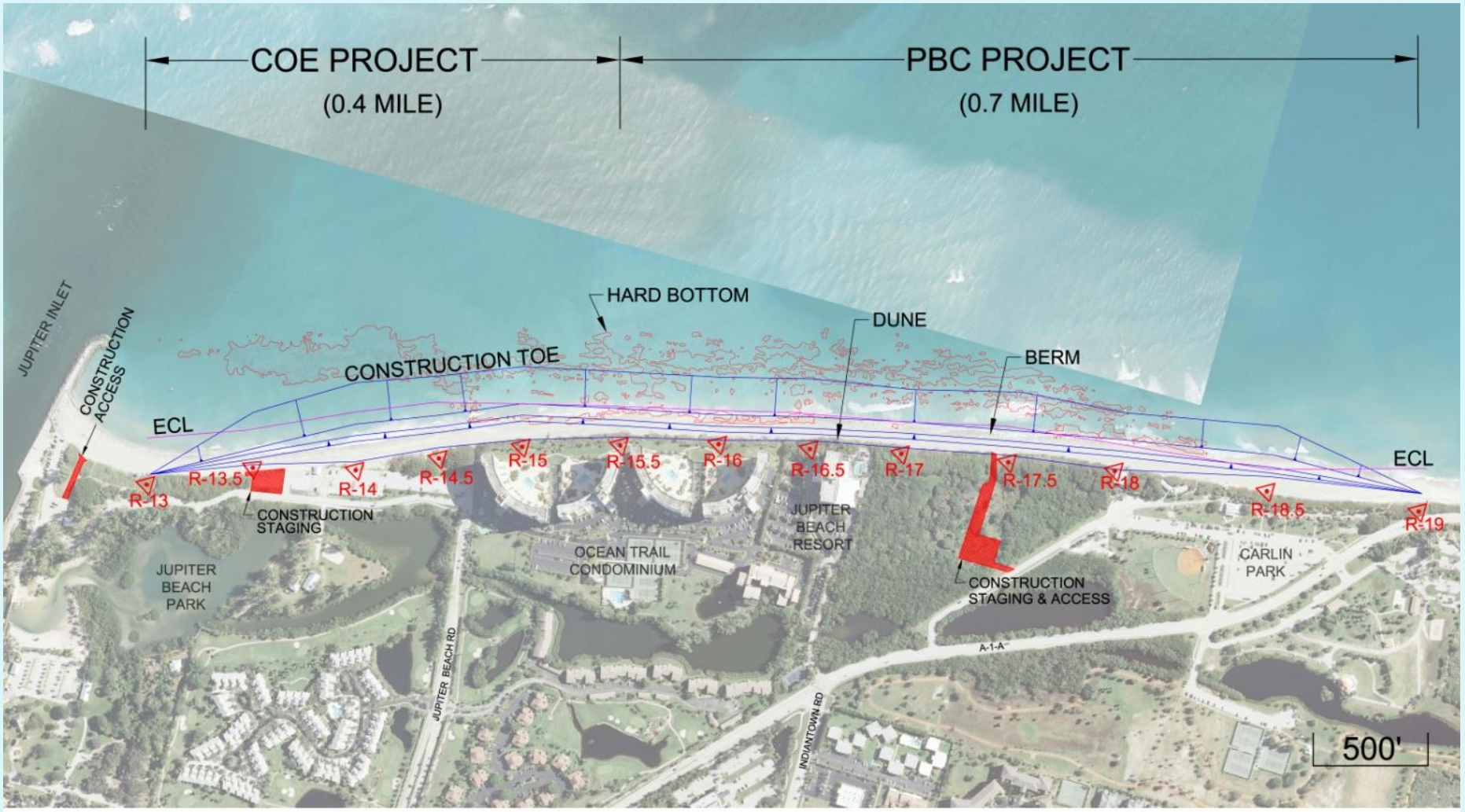
Comprehensive Effort of Individual Projects

3 contractors, 3 sand sources, 3 methodologies

- **PBC – 282,000 CY**
  - Truck haul from an upland sand source
  - R15.5 - R19
  - 11/12/14 – 3/27/15
  - 2800 CY/day
- **USACE – 140,000 CY**
  - Hopper dredge from an offshore borrow area
  - R13 – R15.5
  - Pumping 12/28/14 – 1/6/15
  - 17,500 CY/day
- **JID – 45,300 CY**
  - Cutter head dredge from Inlet sand trap
  - South jetty – R15
  - 3/27/15 – 4/19/15

April 19, 2015

Jupiter/Carlin Nourishment



Adaptive Management

Bids for original dredge project exceeded engineers' estimate and project funding

IFB to Annual Contract in 3 Months

- **Bids opened on 6/10/14**
- **Revise fill template for a reduced volume**
- **Approval of an upland sand source**
- **Permit modifications**
- **Coordination with Town of Jupiter**
- **Annual Contracting**
- **BCC Approves Work Order on 9/9/14**

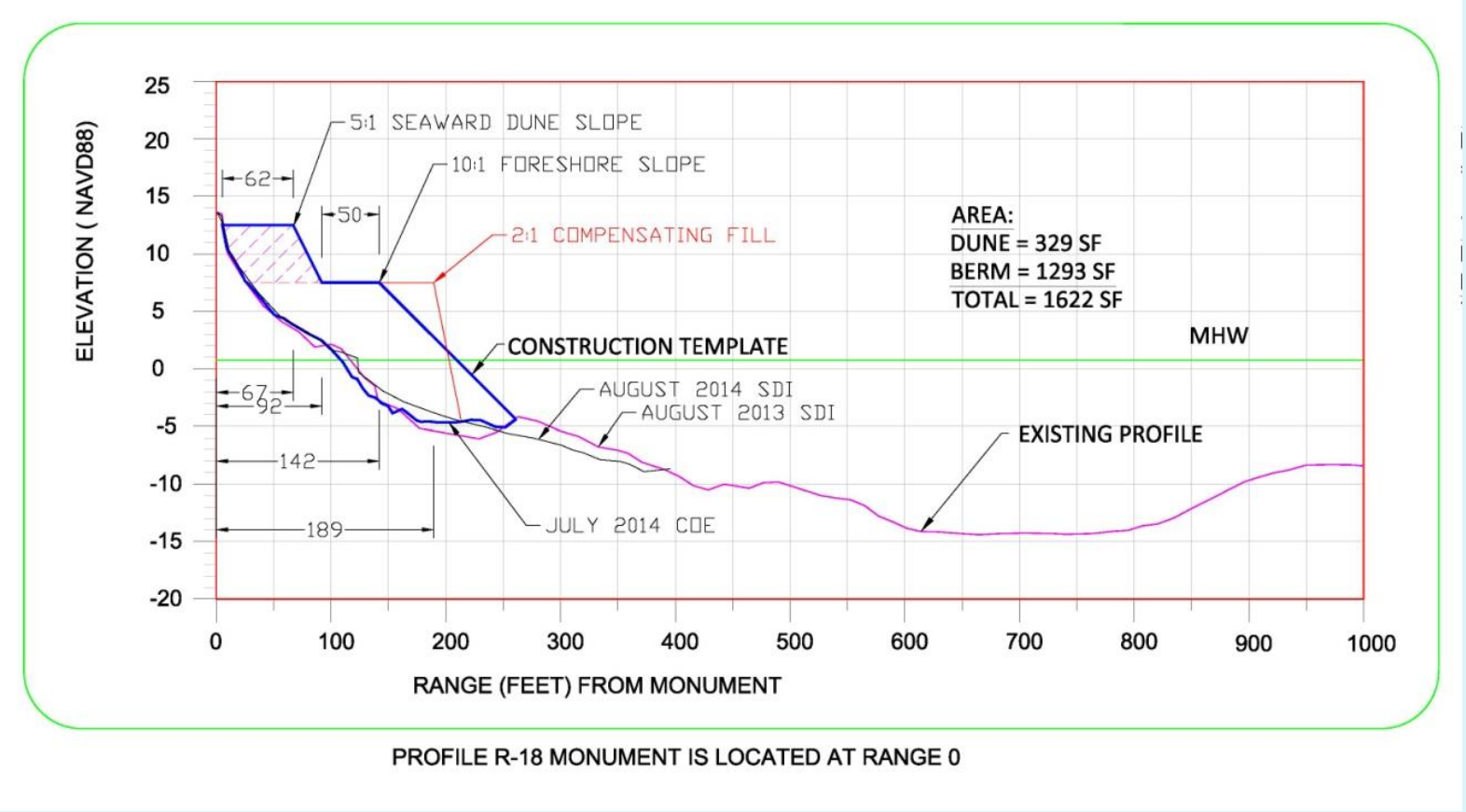
Annual Contract Development

- Prior to 2010, dune restoration was conducted through multiple term contracts
  - PM acted as GC
  - Inefficient
  - Difficult to budget

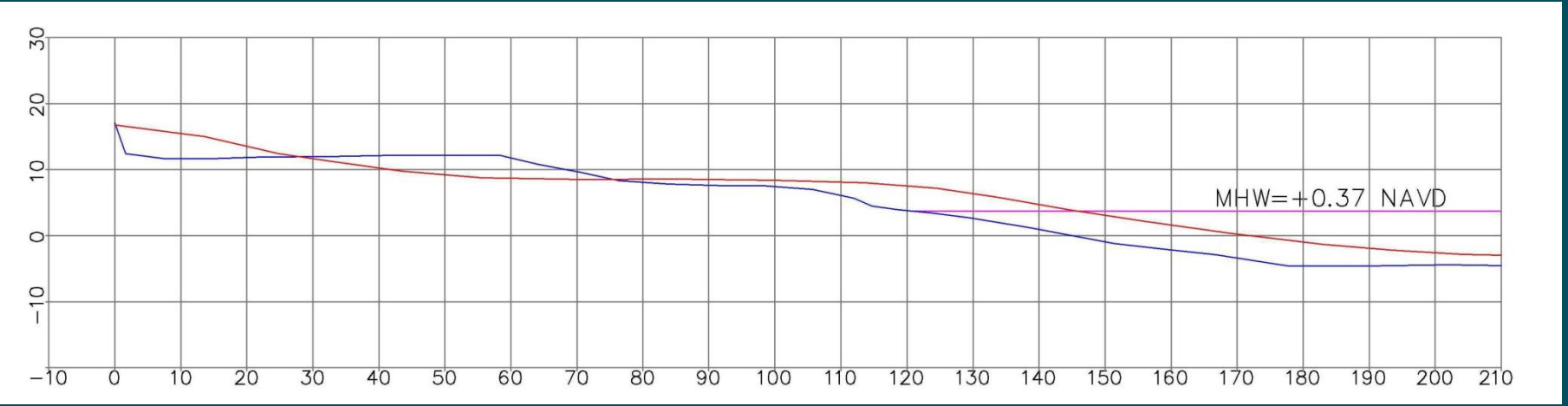
- 1st Dune Restoration Annual Contract Awarded in 2010
  - Primary contractor responsible for coordination with subcontractors
  - Unit prices based on volume, not time
  - Project costs are easily calculated

Compensating Slope

- Reduces material below MHW, reduces hydraulic losses during placement
- Ensure proper distribution of volume throughout the project area
- Reduces turbidity during placement



Project Equilibration



DATA COLLECTED ON MARCH 2015.
DISTANCE IN FEET.
ELEVATION IN FEET NAVD.

R−18

R−14

Event Planning

+

||

Innovative Measures

- PWC for turbidity monitoring

- Efficient deployment from the project area

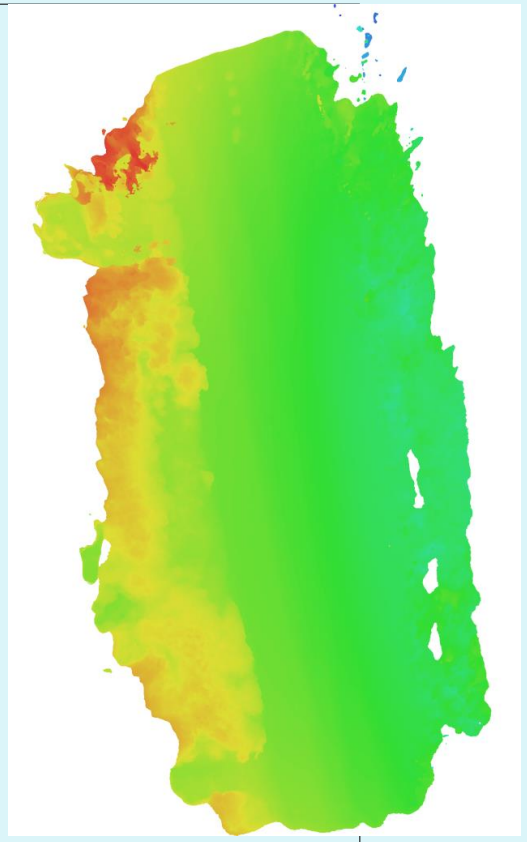
- Facilitated sampling in shallow depths

Innovative Measures

UAS Monitoring and Integration of Photogrammetry

DJI Phantom 2 Vision Plus

Orthophoto 8/28/15



Digital Elevation Model

Credit: Conor Maguire; Agisoft Photoscan

Considerations

- Refine Annual Contract to facilitate large scale placements
- Independent materials contract directly with the mines
  - Stockpile sand prior to mobilization
- Availability of resources

Cooperation and Coordination

Special Acknowledgement to PM – Tracy Logue

Sea Turtle Activity

Sea Turtle Activity

- Palm Beach County - 65.5 km of monitored coastline
- 5% of the statewide total coastline
- **22% of statewide nesting**

Sea Turtle Activity

- Palm Beach County has the densest loggerhead nesting in the state of FL
- Over 1,500 crawls per mile
- 2014
  - 24,951 loggerhead nests
  - 1,884 green turtle nests
  - 511 leatherback nests

Jupiter

- 2.5 km of monitored beach
- 4 different sand types
- Standard surveys
  - Species
  - Crawl Type
  - Location
  - Obstructions
  - Reproductive Success

Jupiter

- 2015
  - 5,623 total crawls
    - 1,463 Cc nests
    - 727 Cm nests (record)
    - 37 Dc nests

Jupiter

- Is there any difference in activity or success?
- Use standard surveys, data loggers, and sand analysis to look further.

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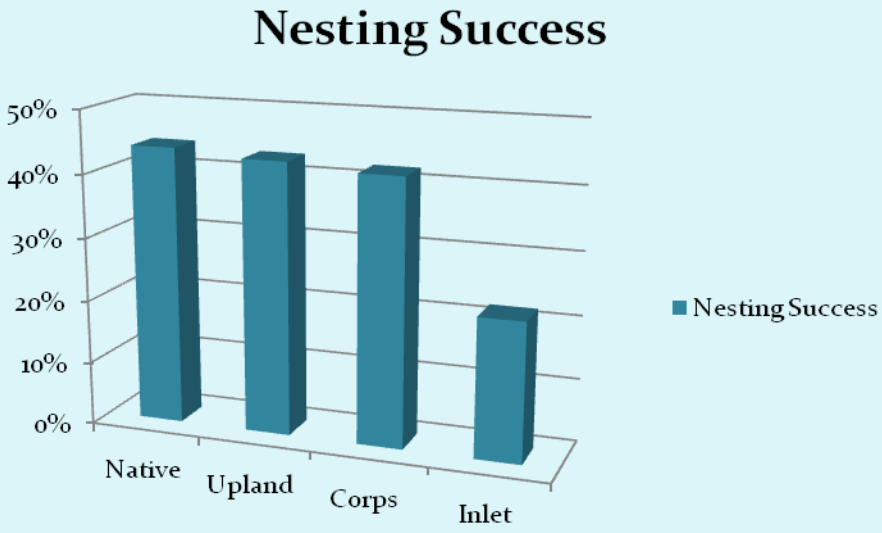
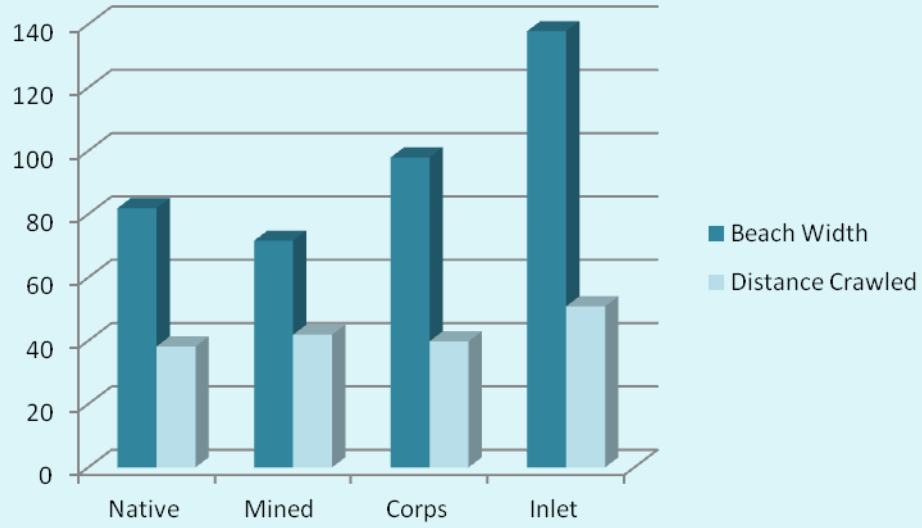


The inlet area typically has escarpments that can contribute to a decrease in nesting success.

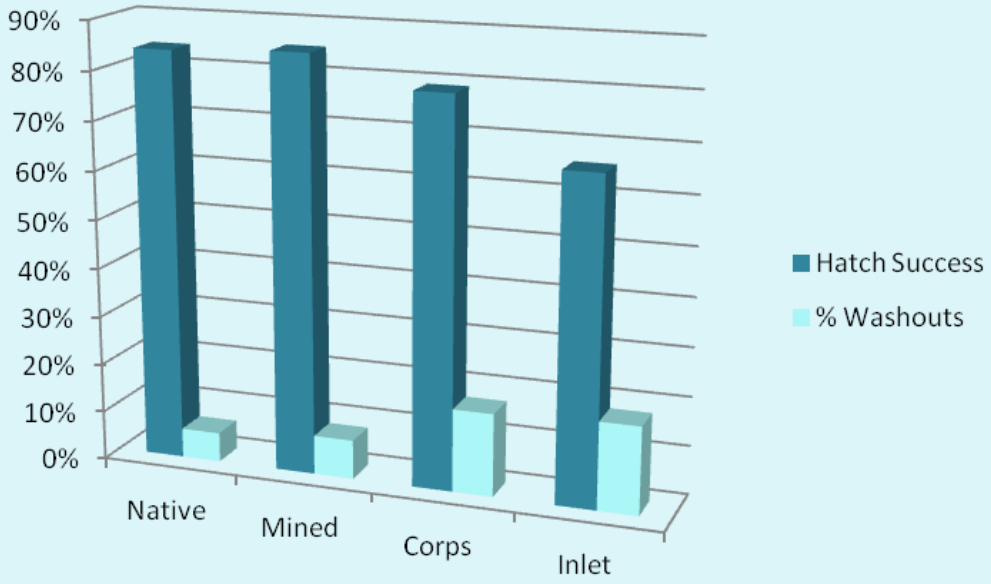
	Native	Upland	Corps	Inlet
# Nests	623	1,184	205	215
Nests/Km	884	1137	965	398
Nesting Success	44%	43%	42%	22%

Jupiter



	Native	Mined	Corps	Inlet
Beach Width	81.9	71.6	97.9	137.8
Distance Crawled	38.2	41.91	39.83	50.86
% Utilized	46%	59%	29%	52%

Jupiter

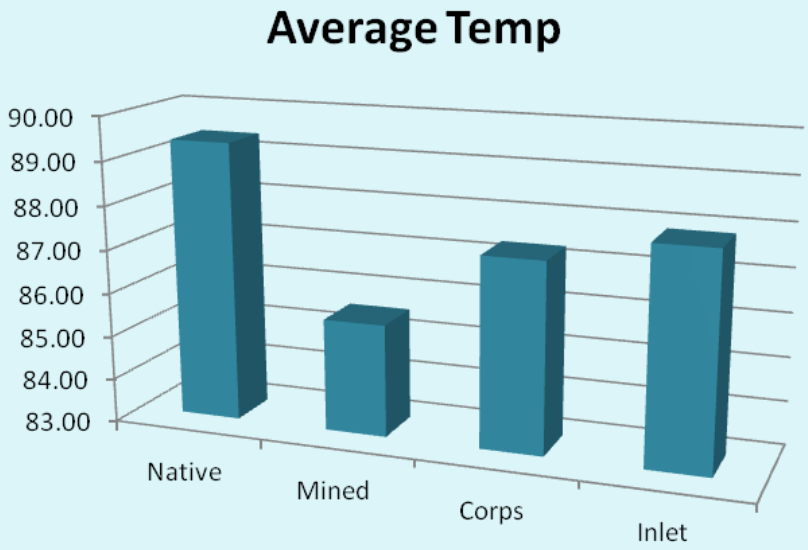


- There is a decrease in hatch success and an increase in the number of washouts
- There are many factors that could contribute to these fluctuations

	Native	Mined	Corps	Inlet
Hatch Success	84%	85%	79%	66%
% Washouts	6%	8%	17%	18%

Jupiter

	Native	Mined	Corps	Inlet
Average Temp	89.39	85.57	87.33	87.89
Incubation Period	52 days	54 days	50 days	50 days



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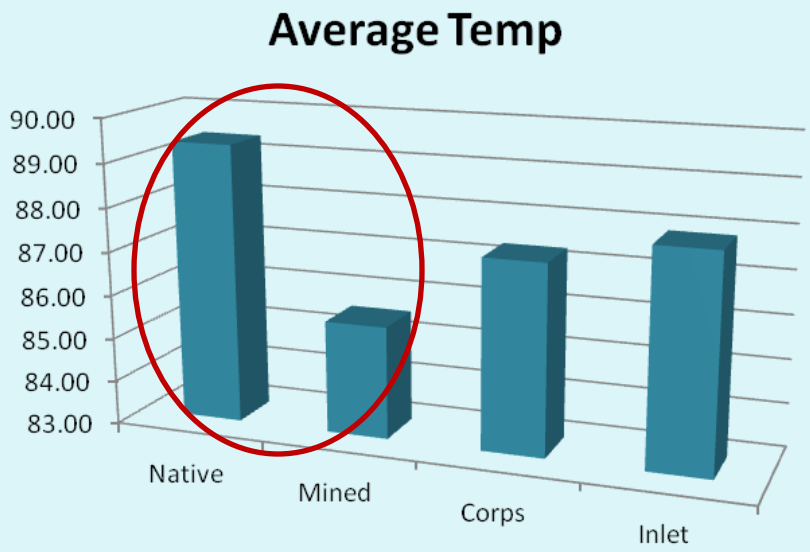
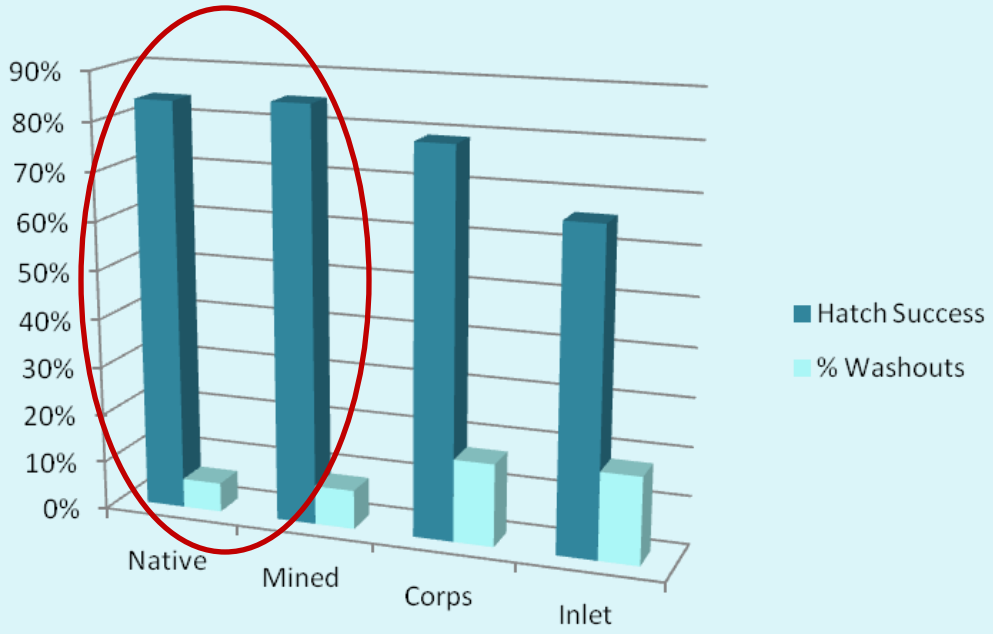


- The largest variation from native temperature produced similar success rates.
- There are many factors influencing nest success.



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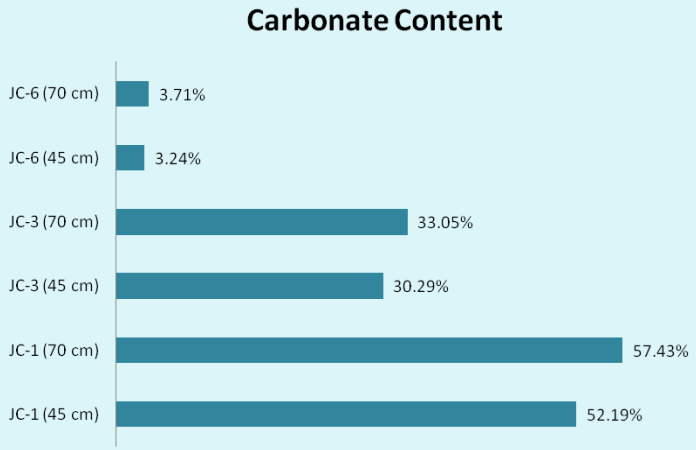
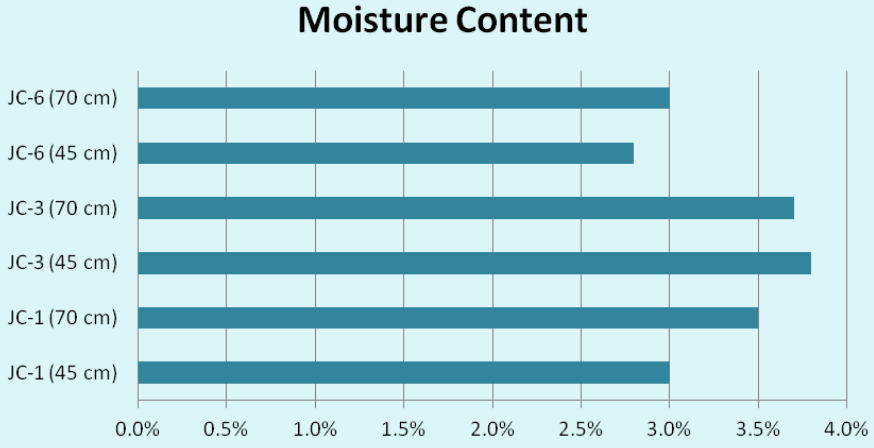

Carbonate Content
JC-6 (70 cm)
3.71%
JC-6 (45 cm)
3.24%
JC-3 (70 cm)
33.05%
JC-3 (45 cm)
30.29%
JC-1 (70 cm)
57.43%
JC-1 (45 cm)
52.19%


Moisture Content
JC-6 (70 cm)
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JC-3 (45 cm)
JC-1 (70 cm)
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0.0%
0.5%
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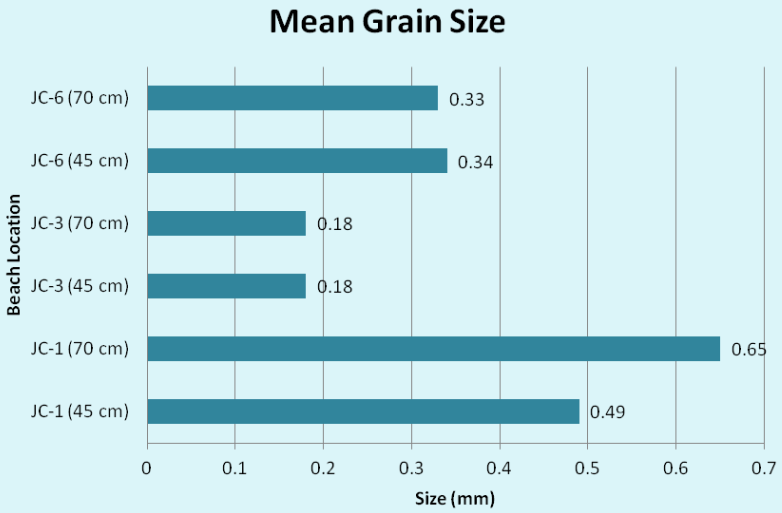
2.0%
2.5%
3.0%
3.5%
4.0%


Mean Grain Size
Beach Location
JC-6 (70 cm)
0.33
JC-6 (45 cm)
0.34
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0.18
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0.65
JC-1 (45 cm)
0.49
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0.1
0.2
0.3
0.4
0.5
0.6
0.7
Size (mm)

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- Sand sources and beach profile affect nest site selection, nest success, emergence success and sex ratios.
- There are many factors that go into each of these parameters.
- Over the next year or two we will begin to statistically analyze the hundreds of thousands of data points that we've collected on this beach.

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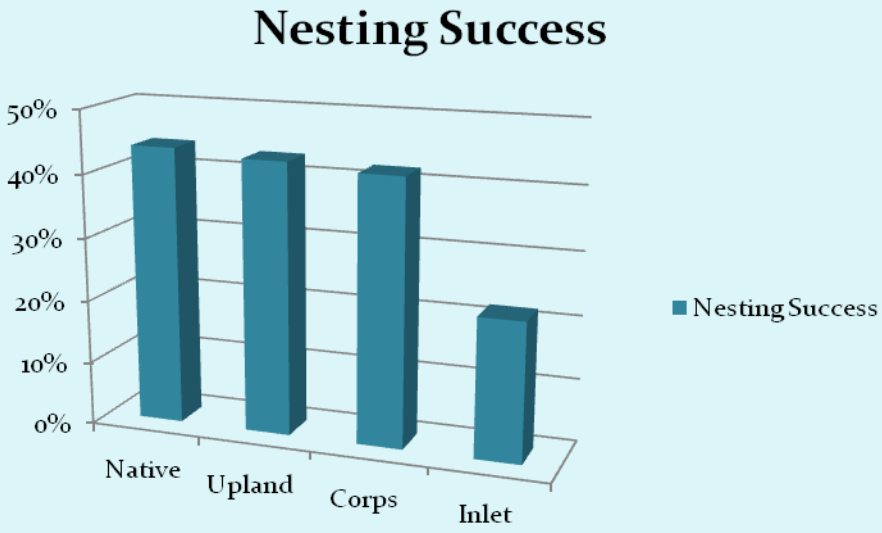

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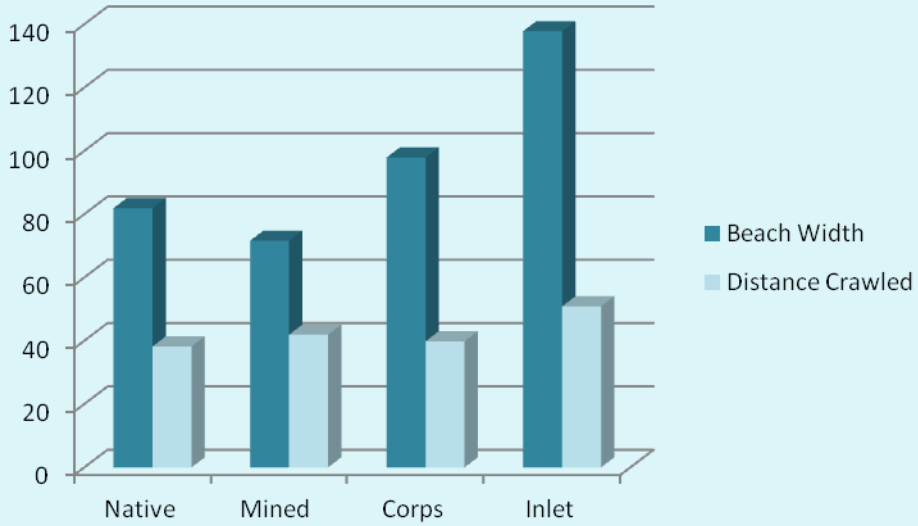

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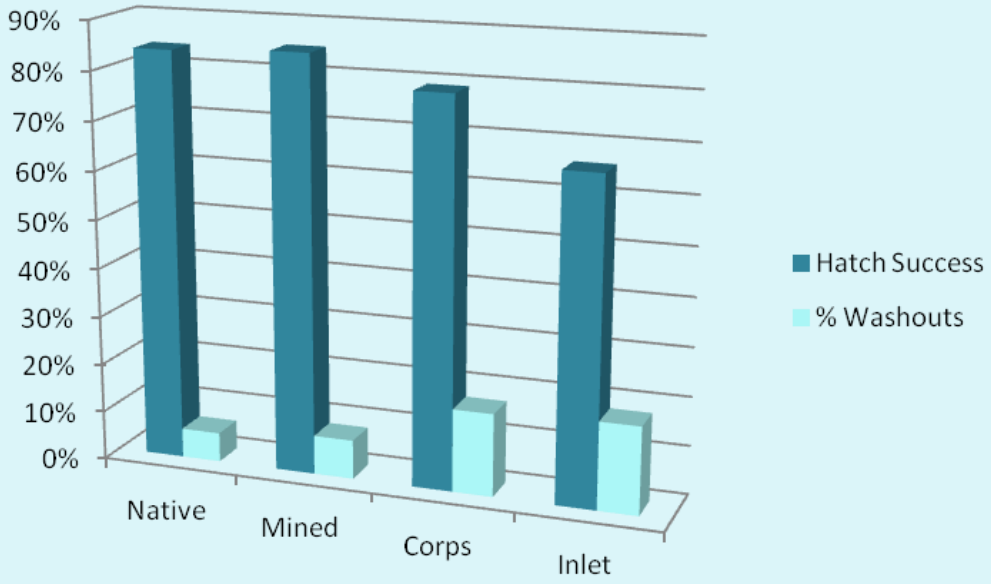

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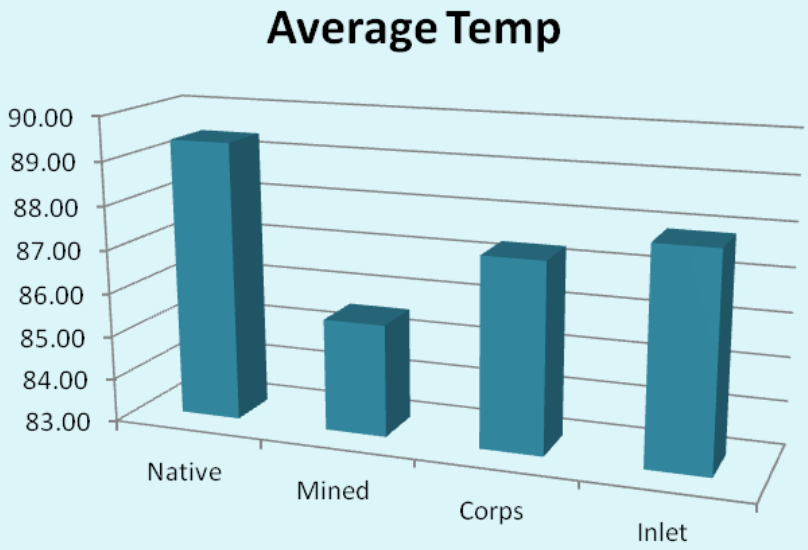

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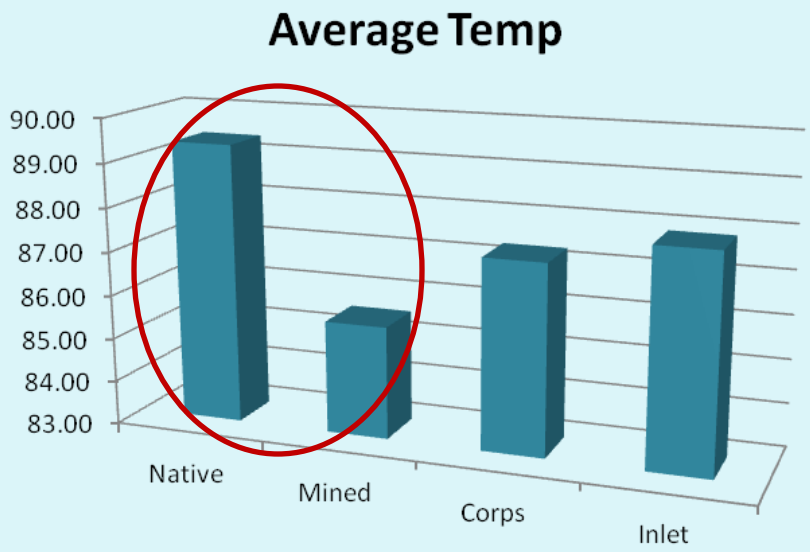

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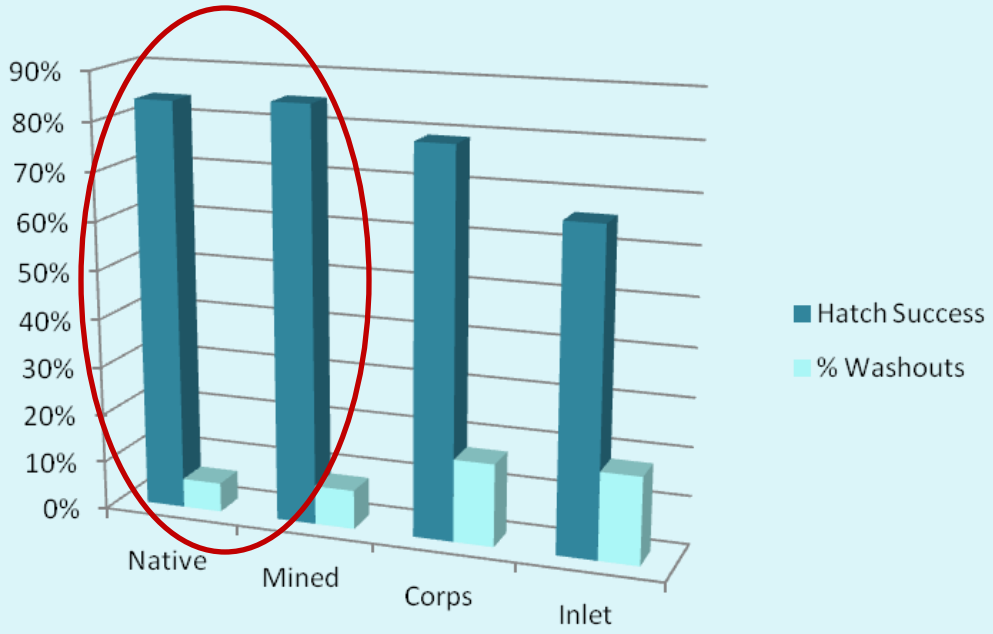

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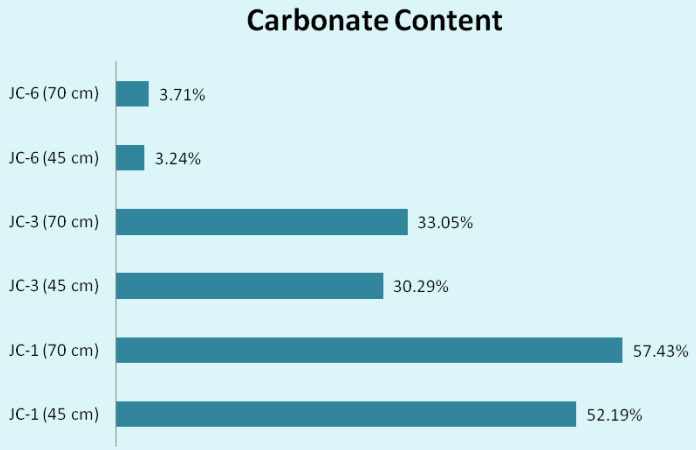
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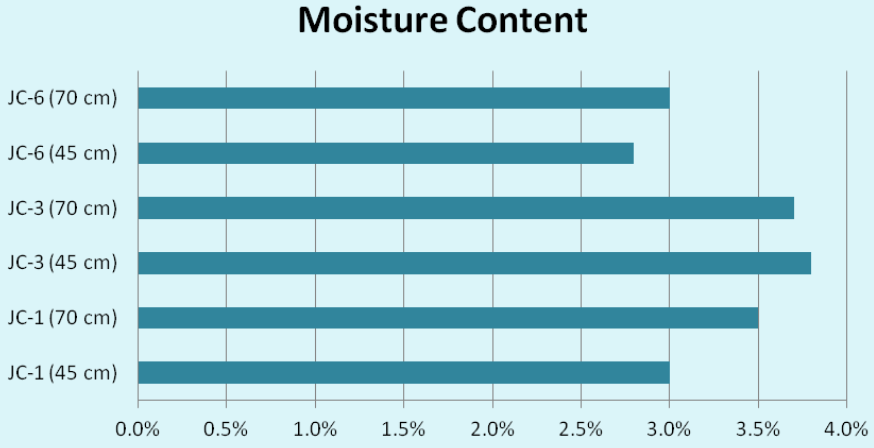
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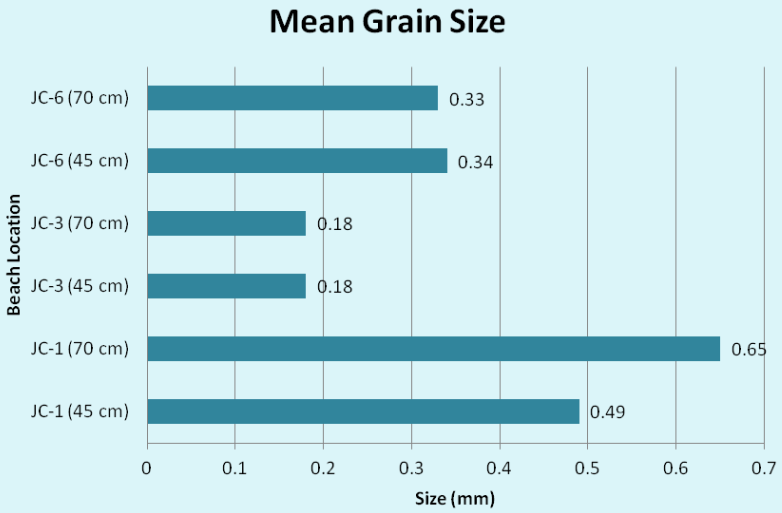
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