Can Beach Nourishment be an Adaptation Strategy for Sea Level Rise?

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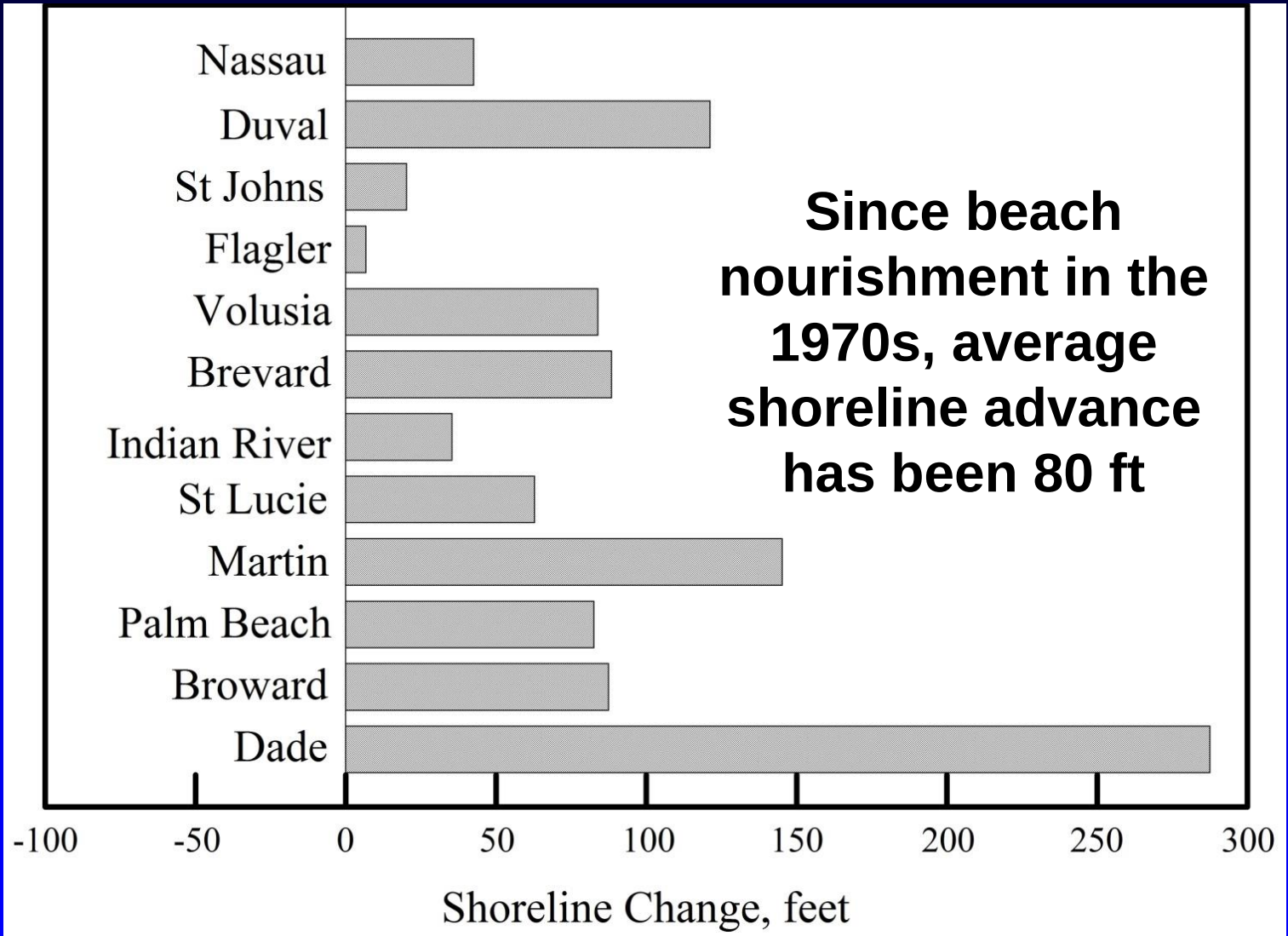
Can Beach Nourishment be an Adaptation Strategy for Sea Level Rise?

1. Can beach nourishment keep sea level rise at bay?
2. Is a beach nourishment strategy worth the cost?

Can Beach Nourishment be an Adaptation Strategy for Sea Level Rise?

Beach nourishment has been Florida's sea level rise adaptation strategy since the 1970s

How Well has it Worked?



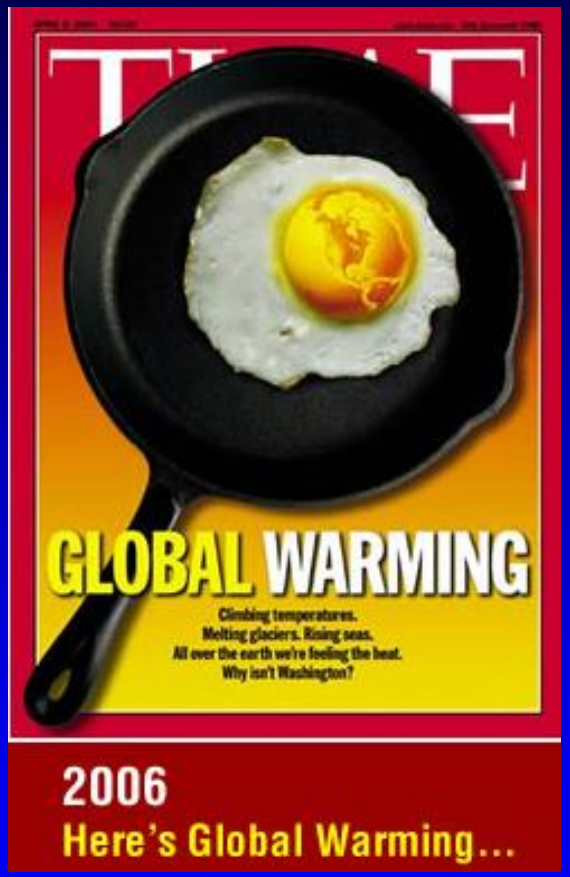
Based on Monument Measurements
(Houston and Dean, Journal of Coastal Research, 2014)

Much of the 80 ft Gain Was Getting Back What We Lost

Miami Beach


That was then.
What about future sea level rise?

Climate Change and Sea Level Rise – What Nice Non-Controversial Topics



"Skeptics" "Undecided" "Believers"

U.S agencies should present facts and their best understandings and not exaggerate to scare society into taking particular actions

Paradox

- All US agencies accept carbon dioxide and temperature projections of the Intergovernmental Panel on Climate Change (IPCC)
- None accept IPCC sea level rise projections
- Agencies do their own thing, choosing sea level projections from single papers or commissioning their own panels

- The result is confusion and a lack of credibility of agency and IPCC projections

Worldwide Sea Level Rise Projections, 1990 - 2100

Rahmstorf dramatizing sea level rise

Meters

1.95
1.80 — 6 ft
1.65
1.50 — 5 ft
1.35
1.20 — 4 ft
1.05
0.90 — 3 ft
0.75
0.60 — 2ft
0.45
0.30 — 1 ft
0.15
0.00

All claim their maximums are greater

Maximum can be exceeded. Odds are 40 to 1 against being exceeded

because IPCC didn't adequately consider dynamic ice melt

"Semi-Empirical" Models

IPCC 1990
IPCC 1995
IPCC 2001
IPCC 2007
Rahmstorf 2007
Vermeer & Rahmstorf 2009
Jevrejeva et al 2010
IPCC 2013

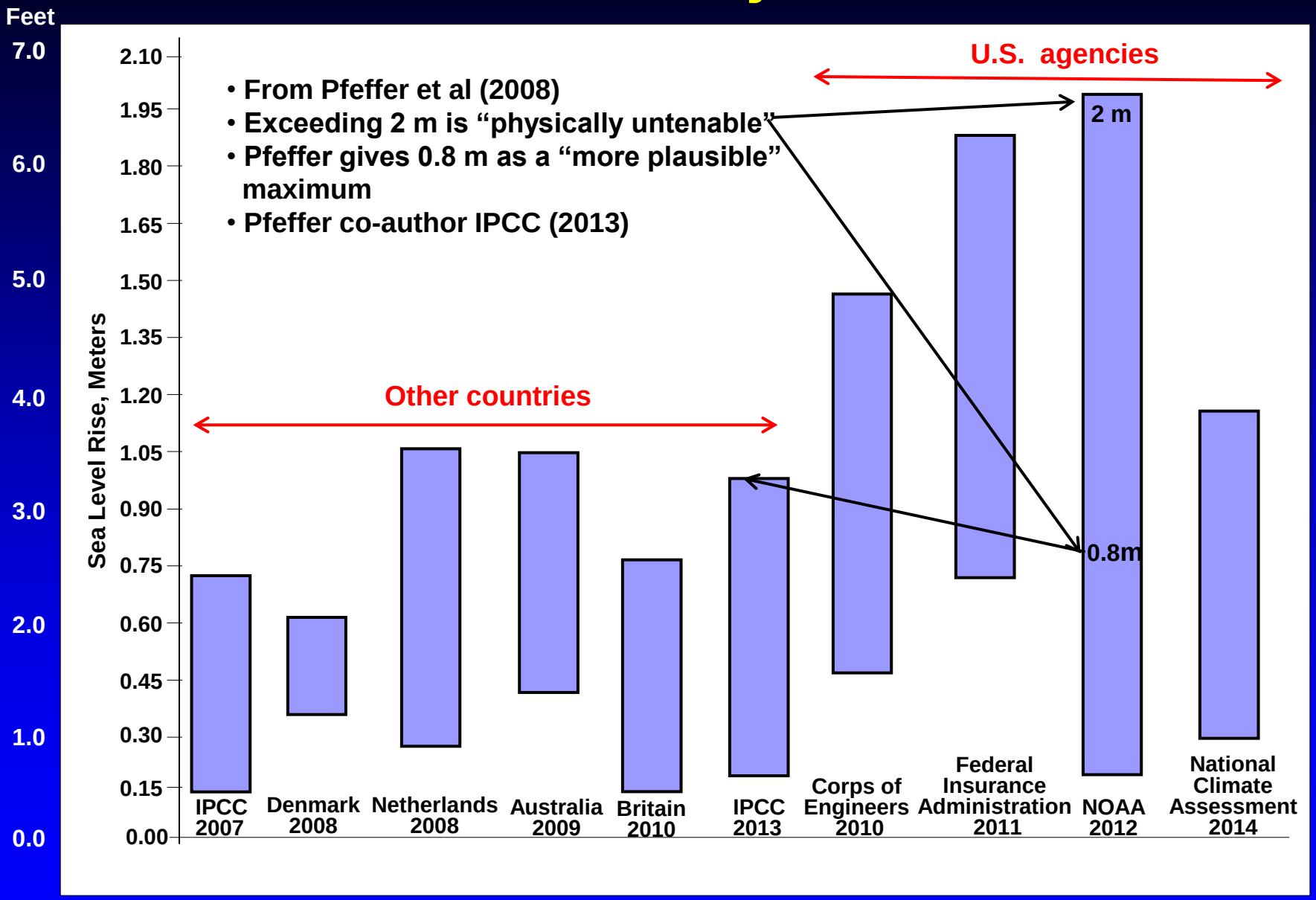
IPCC = Intergovernmental Panel on Climate Change

What‘s Wrong with Maximum Possible Rises?

- While I am speaking, we could be hit by a meteorite similar to the one that hit Siberia last year, and we all could die

- We’re not too concerned because the probability is so tiny
- Sea level rise projections without probabilities are not useful
- IPCC projections have probabilities

Worldwide Sea Level Projections 1990 to 2100



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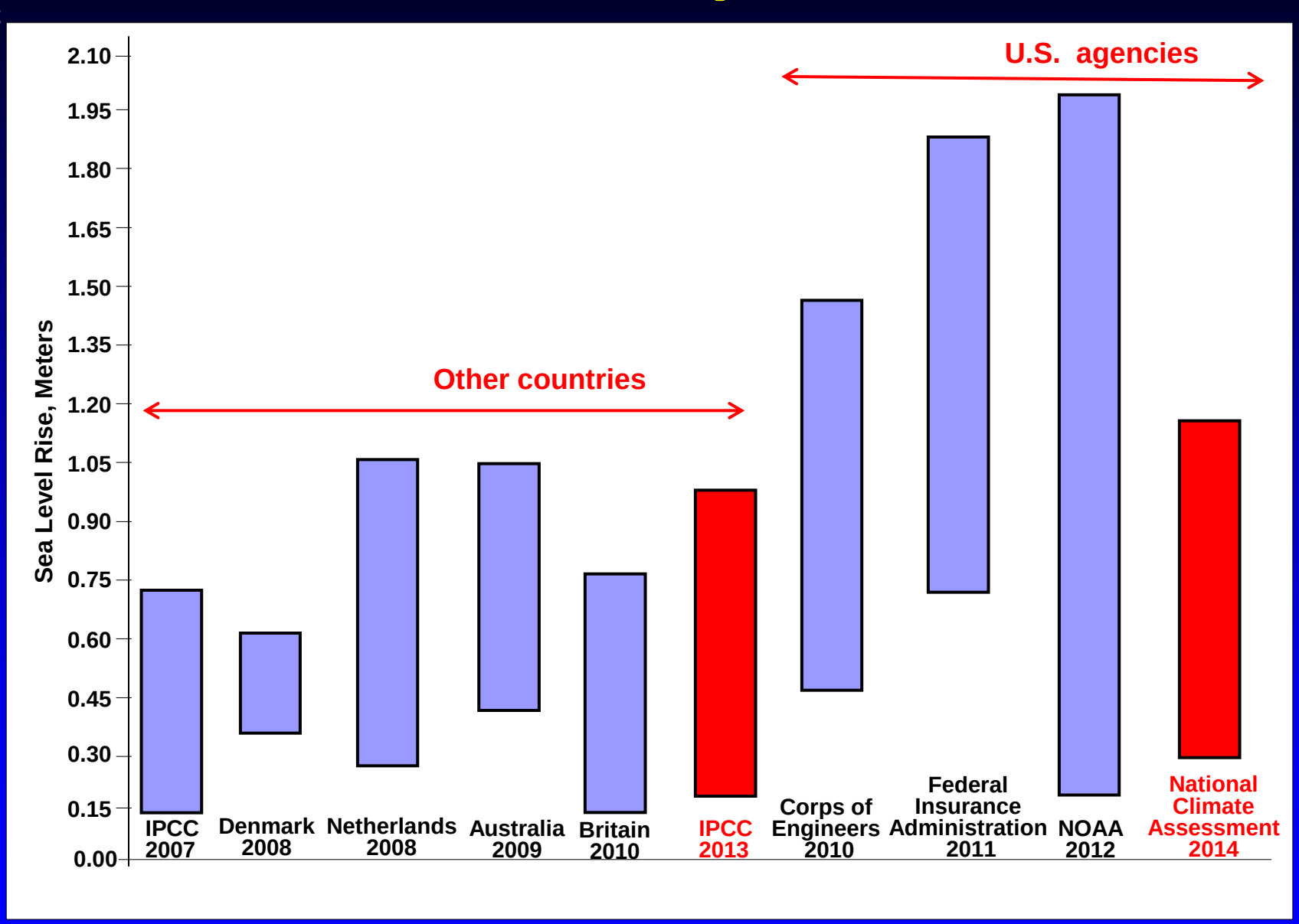

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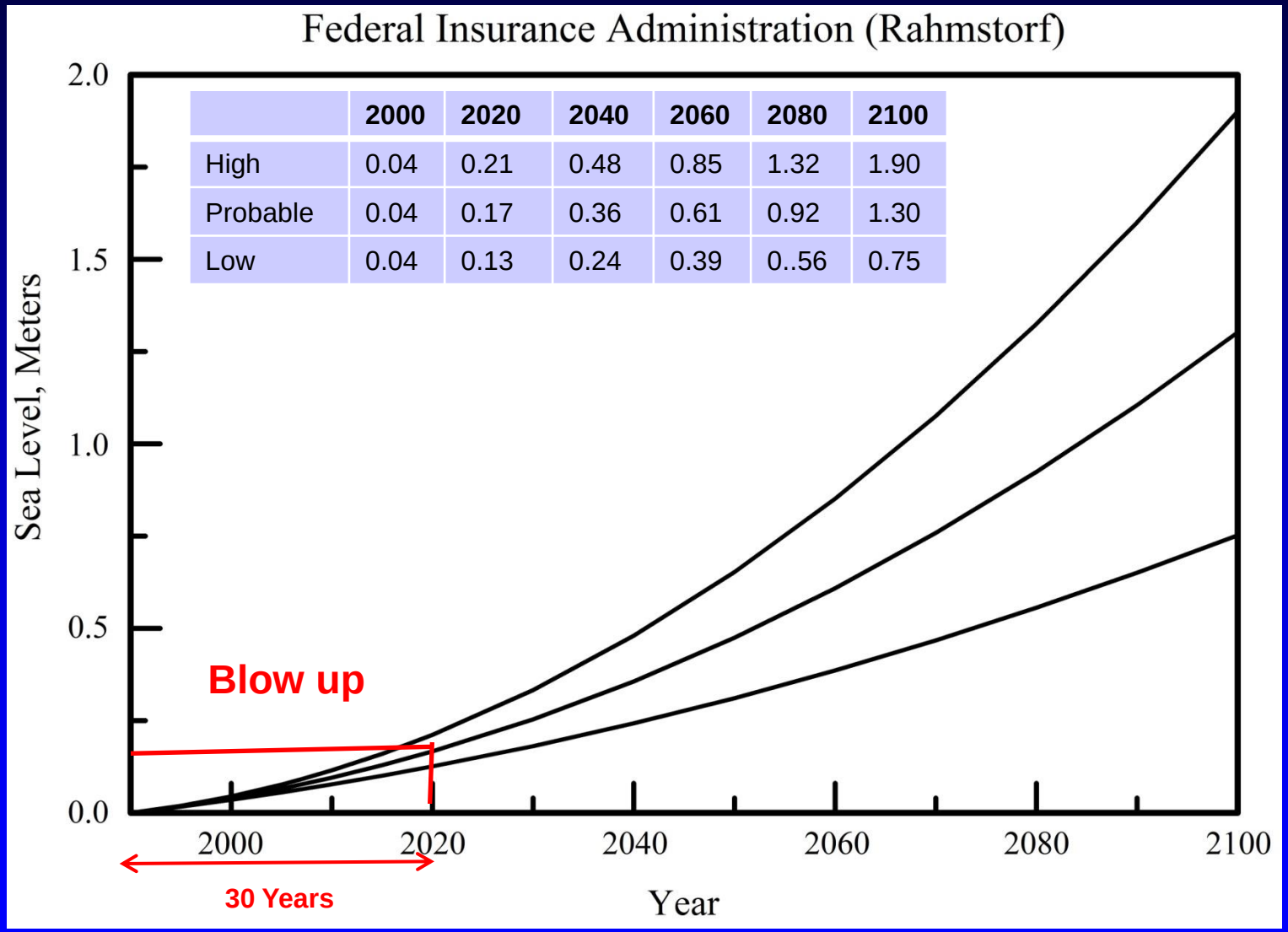
FIA Projections 1990 to 2100



	2000	2020	2040	2060	2080	2100
High	0.04	0.21	0.48	0.85	1.32	1.90
Probable	0.04	0.17	0.36	0.61	0.92	1.30
Low	0.04	0.13	0.24	0.39	0..56	0.75

6ft
4 ft
2 ft
0 ft

High
1.9 m

Probable
1.3 m

Low
0.75 m

FIA Projections 1990 to 2020

High

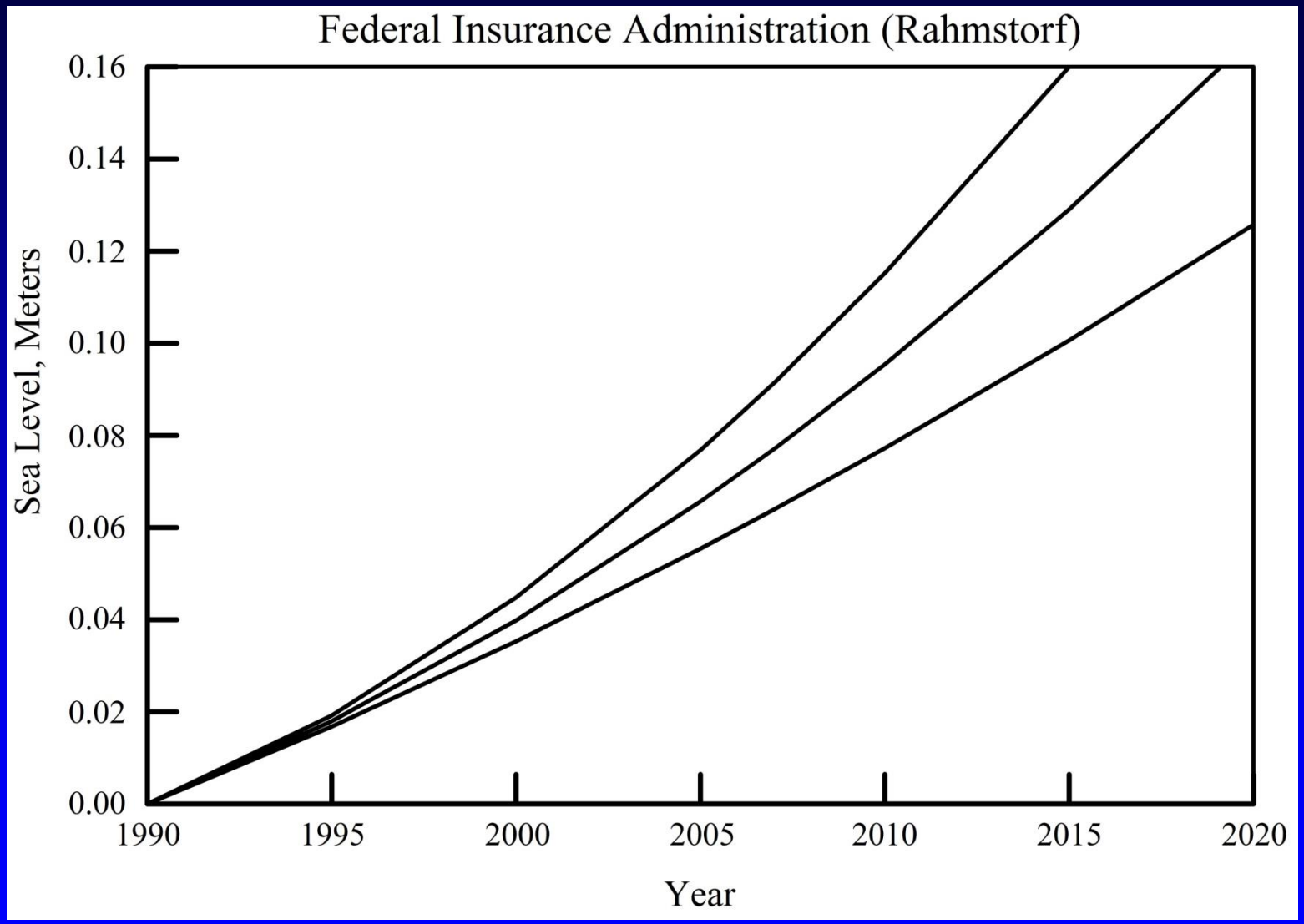
6 in

Probable

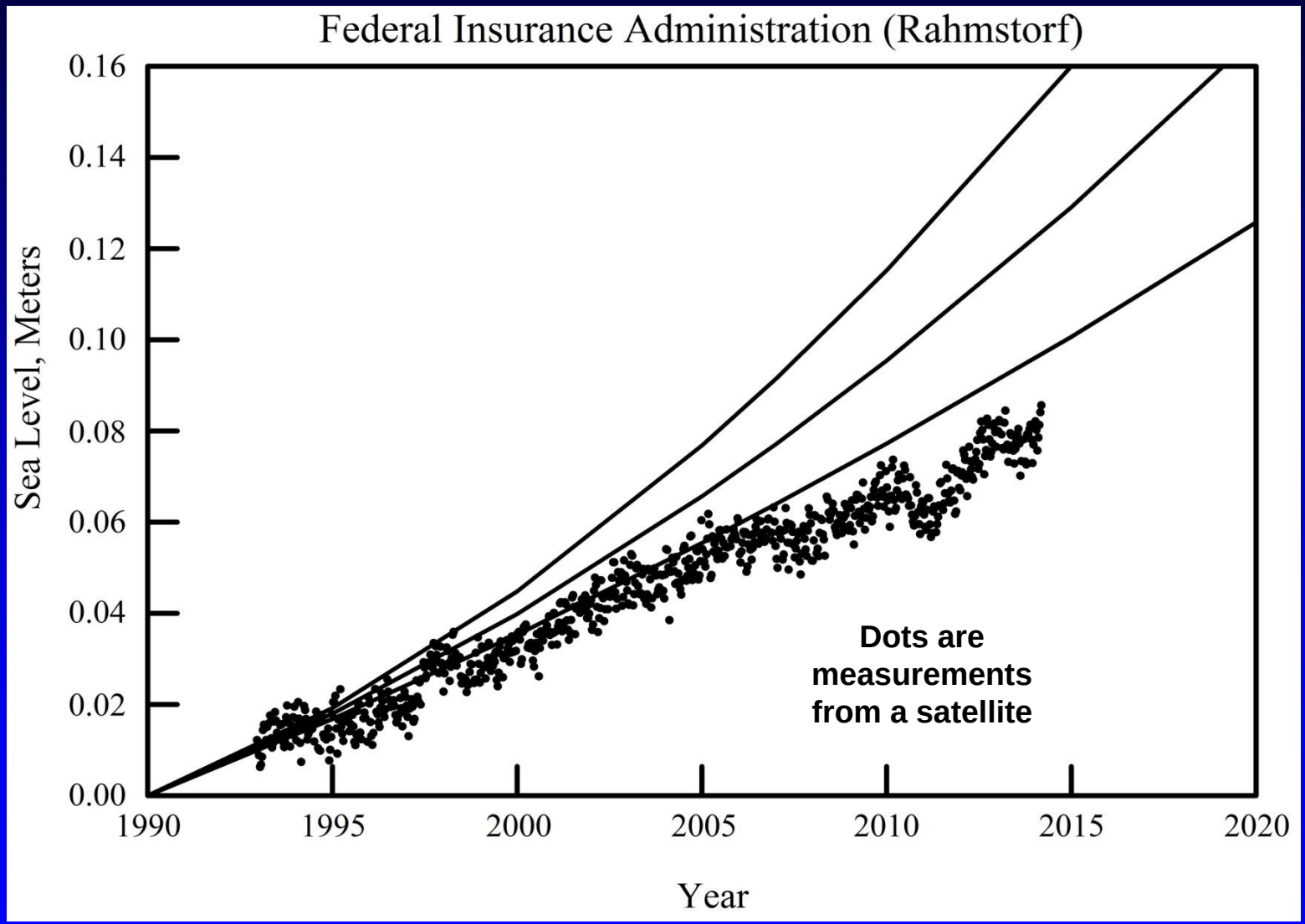
Low

3 in

0 in



FIA Projections Versus Data

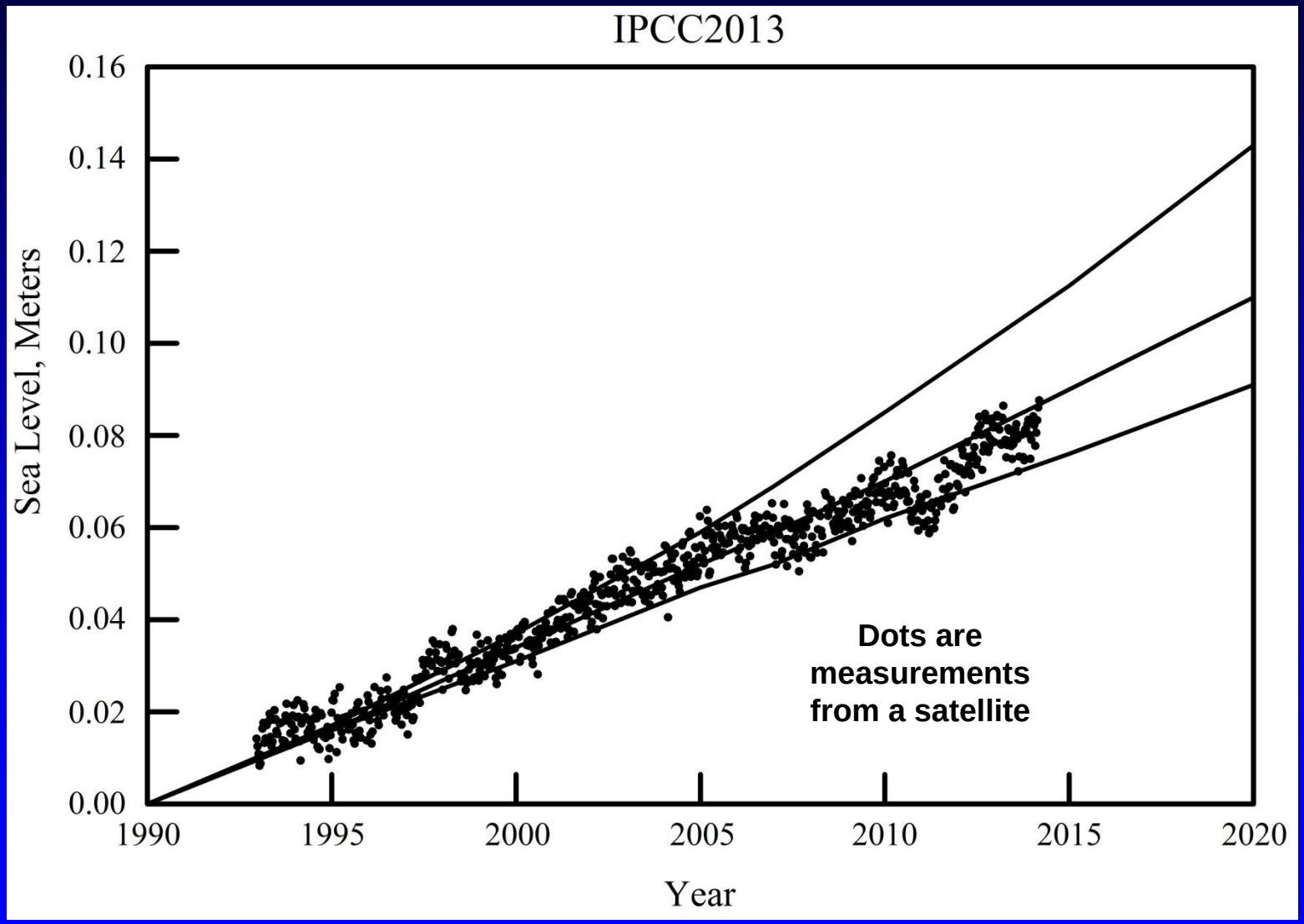


IPCC Projections Versus Data

6 in

3 in

0 in



High

Probable

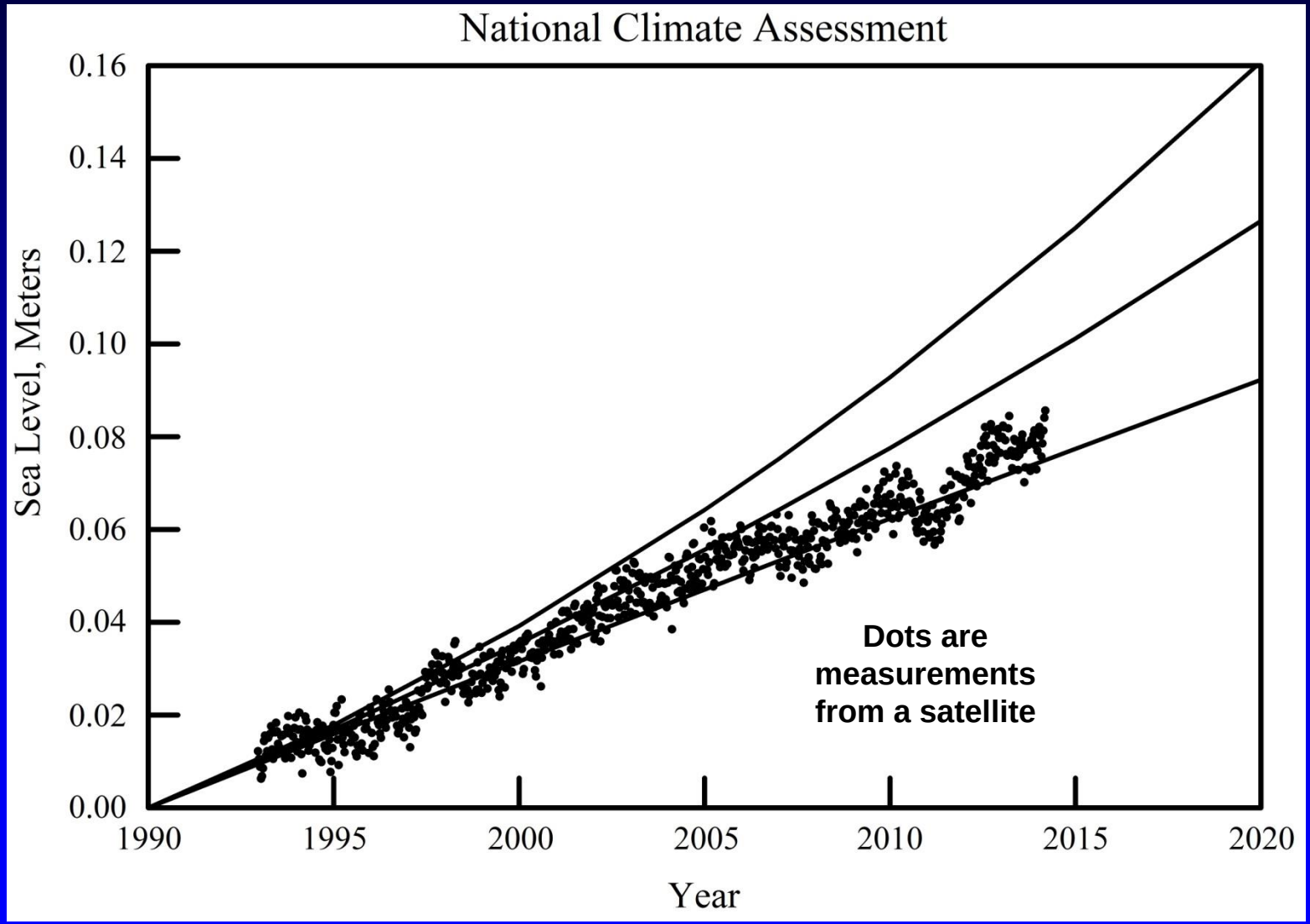
Low

NCA Projections Versus Data

6 in

3 in

0 in



High

Probable

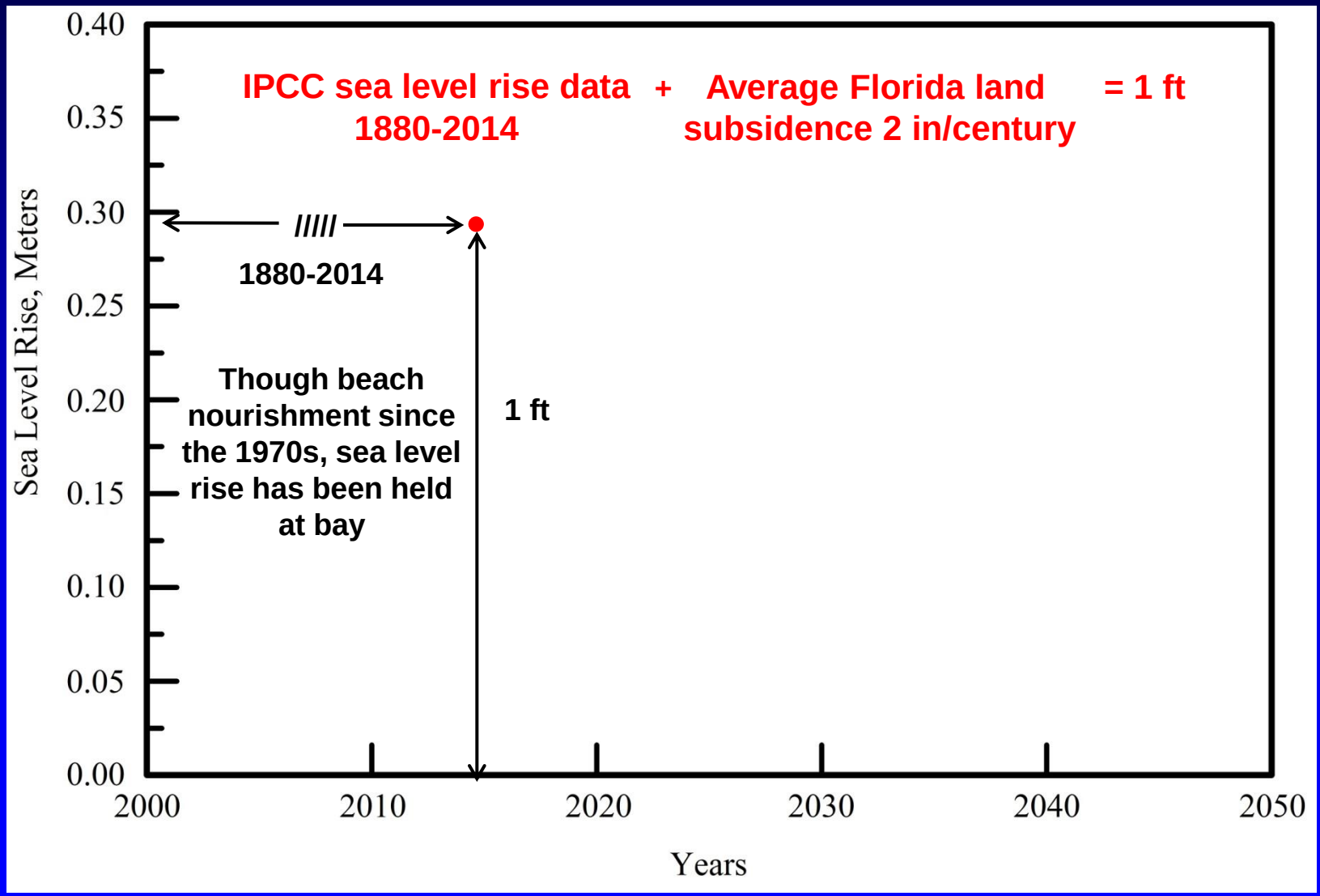
Low

Time Frame for a Beach Nourishment Strategy?

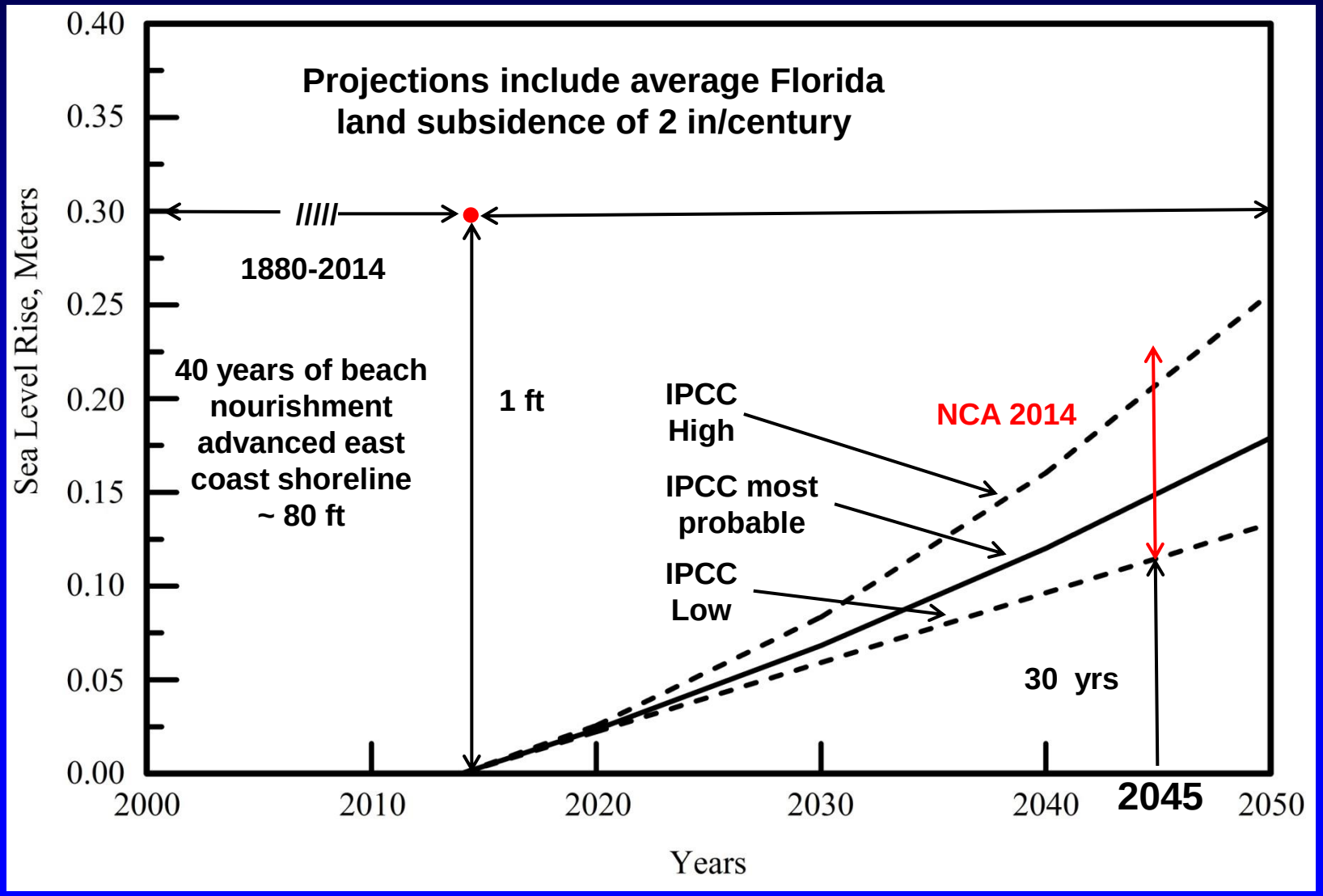
- Most projects have less than 30 years of federal authorization remaining (average 20 years)
- 5 - 10 year renourishment cycles, so a strategy can be periodically revised
- 30 years is a reasonable time frame for a beach nourishment strategy

Can rising sea levels be kept at bay the next 30 years?

Can Beach Nourishment Keep Rising Sea Levels at Bay?

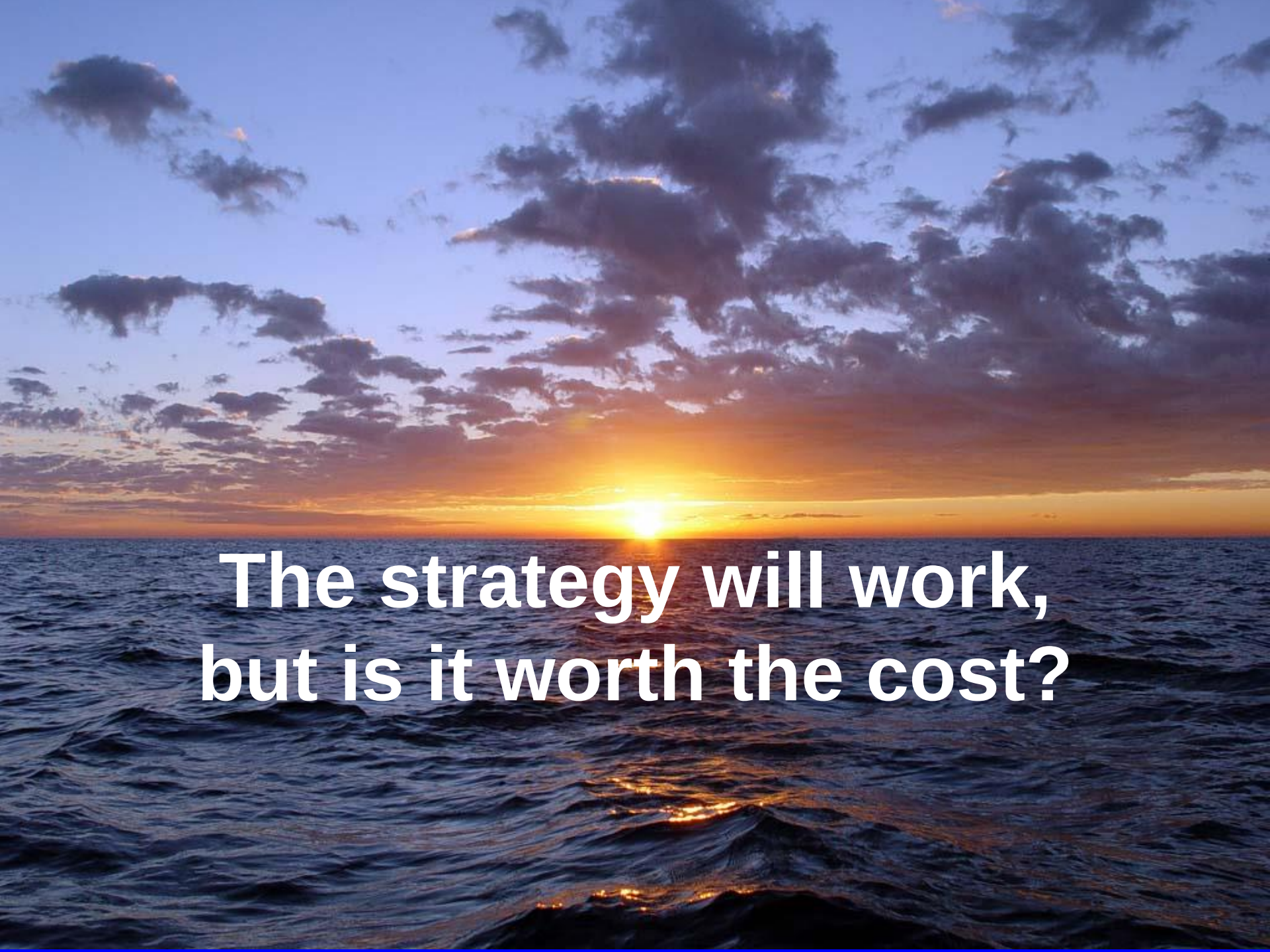


Can Beach Nourishment Keep Rising Sea Levels at Bay?



Dutch Adaptation Strategy for Sea Level Rise

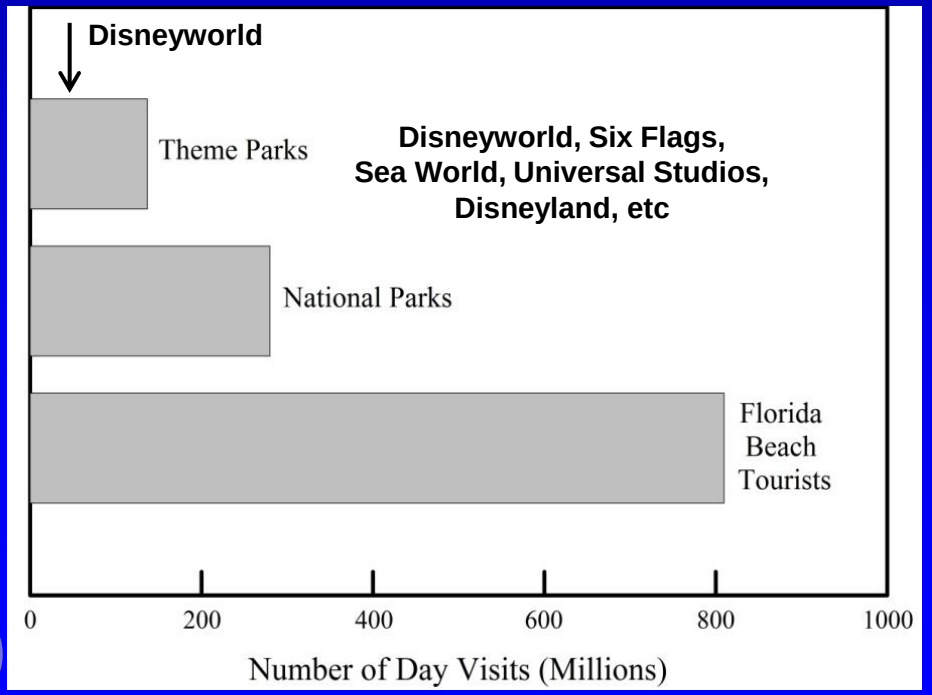
- Beach nourishment is the key component to 2100
- "We have chosen to soften the idea about how to protect the Dutch coast"
- Dutch consider it to be "Engineering With Nature"


The strategy will work,
but is it worth the cost?

Economic Value of Beaches

- Florida beaches have 70 times more tourist visits than visits to Yellowstone, Yosemite, and the Grand Canyon combined (Park Service, 2012)
- Florida beaches have more tourist visits than all theme parks and National Parks combined
- Florida tourists spend $72 billion annually, and tourism is the # 1 employer

(VisitFlorida, 2013; Bureau of Labor Statistics, 2013; Florida TaxWatch, 2013, Houston, 2013)



Economic Value

- **If Florida were a country, it would have the most tourists visits in the world**

Country	Tourists (Millions)
Florida	94.7
France	79.5
United States	62.3
China	57.6
Spain	56.7

Country	Spending (Billions)
United States	90.5
Florida	71.5
Spain	59.9
France	53.8
China	48.5

- **If Florida were a country, it would have the second most spending by tourists in the world**

World Tourism Organization 2012 and VisitFlorida 2013

Economic Value

- Although 22nd in land area, Florida has the highest U.S. insured land value of $2.5 trillion - because of its beaches (InsuringFlorida, 2013)

- Florida's public schools are the primary beneficiaries of this value through local property taxes

  (Census Bureau, 2012, Department of Commerce, 2012)

Economic Value

- International tourists spend $25 billion annually in Florida - 50% more than spent on the entire U.S. export crop of corn and wheat
- However, international tourists have options

Corn and wheat crop grown in area 3 times the area of Florida

Canadians can go to the Bahamas

UK and German tourists can go to Spain

Brazilians can go to Barbados

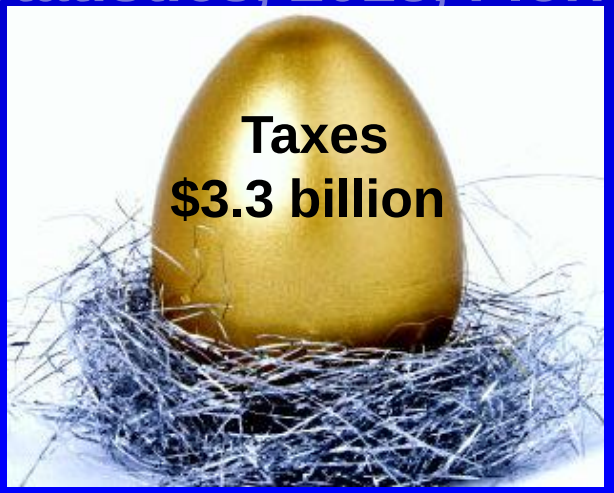
- If Florida beaches are not maintained, international tourists will go elsewhere, and Florida will lose revenues far in excess of beach nourishment costs

Benefit Versus Cost

- Florida beach tourists generate local and State taxes of $1.0 and $2.3 billion respectively = $3.3 billion

  (VisitFlorida, 2013; US Travel Association, 2009; Bureau of Labor Statistics, 2013, Florida DEP, 2010)

- 1% decline in Florida beach tourists reduces State tax revenues by $23 million (more than average State spending for beach nourishment) (VisitFlorida, 2013; US Travel Association, 2009; Bureau of Labor Statistics, 2013, Florida DEP, 2010)



The Golden Egg

Environmental Value

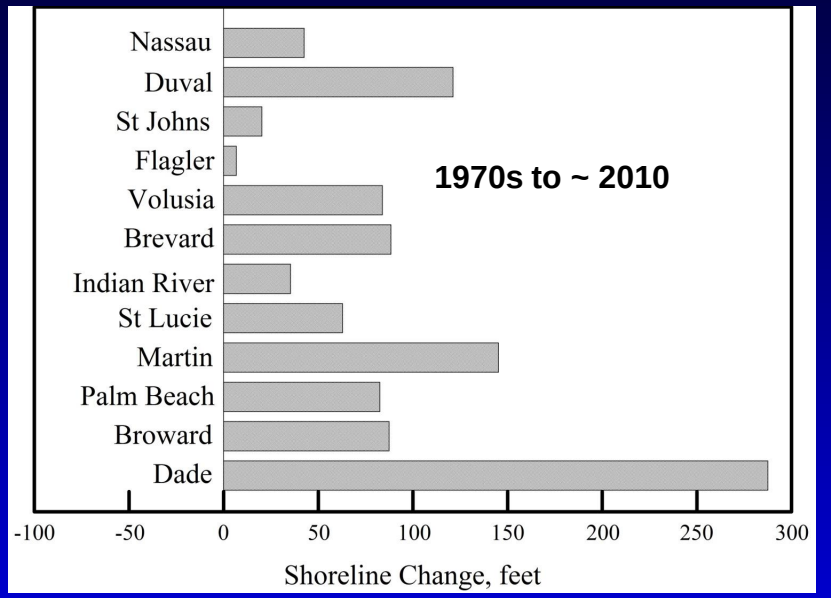
- **Past – Sea turtles could not nest on severely eroded beaches**

- **Present – Restored Beaches**
  - ***"JAX Beach sees record sea turtle nests"*** (ActionNewsJAX.com, 2012)
  - ***"2012 best turtle nesting season in 32 years in South Florida"*** (Palm Coast Post, 2012)
  - ***"Endangered sea turtles nesting at record level along southeast U.S. coast"*** (Reuters, 2013)

Summary

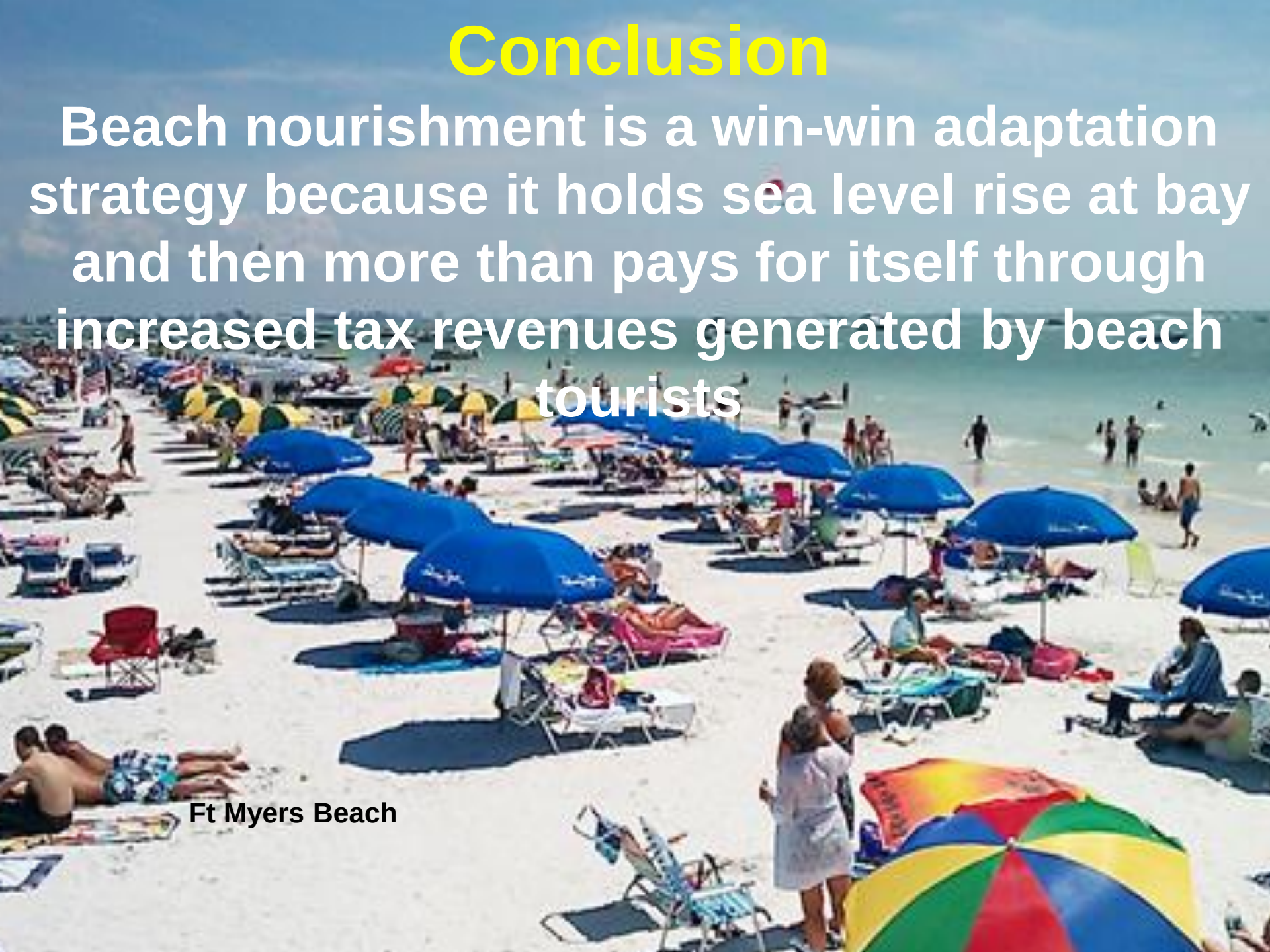
Beach nourishment as an adaptation strategy:

- **Has been very successful since the 1970s**
- **Can maintain average Florida shoreline position for at least the next 30 years**
- **Its economic return to Florida makes it a "no brainer"**



Conclusion

Beach nourishment is a win-win adaptation strategy because it holds sea level rise at bay and then more than pays for itself through increased tax revenues generated by beach tourists



Ft Myers Beach

The End

Ft Myers Beach