Preliminary
Regional Sediment Budget

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D2P Preliminary Regional Sediment Budget

- Littoral Cells in Study Area
- Methodology
- Sediment Budget by Littoral Cell
- Summary
- Recommendations for Further Study

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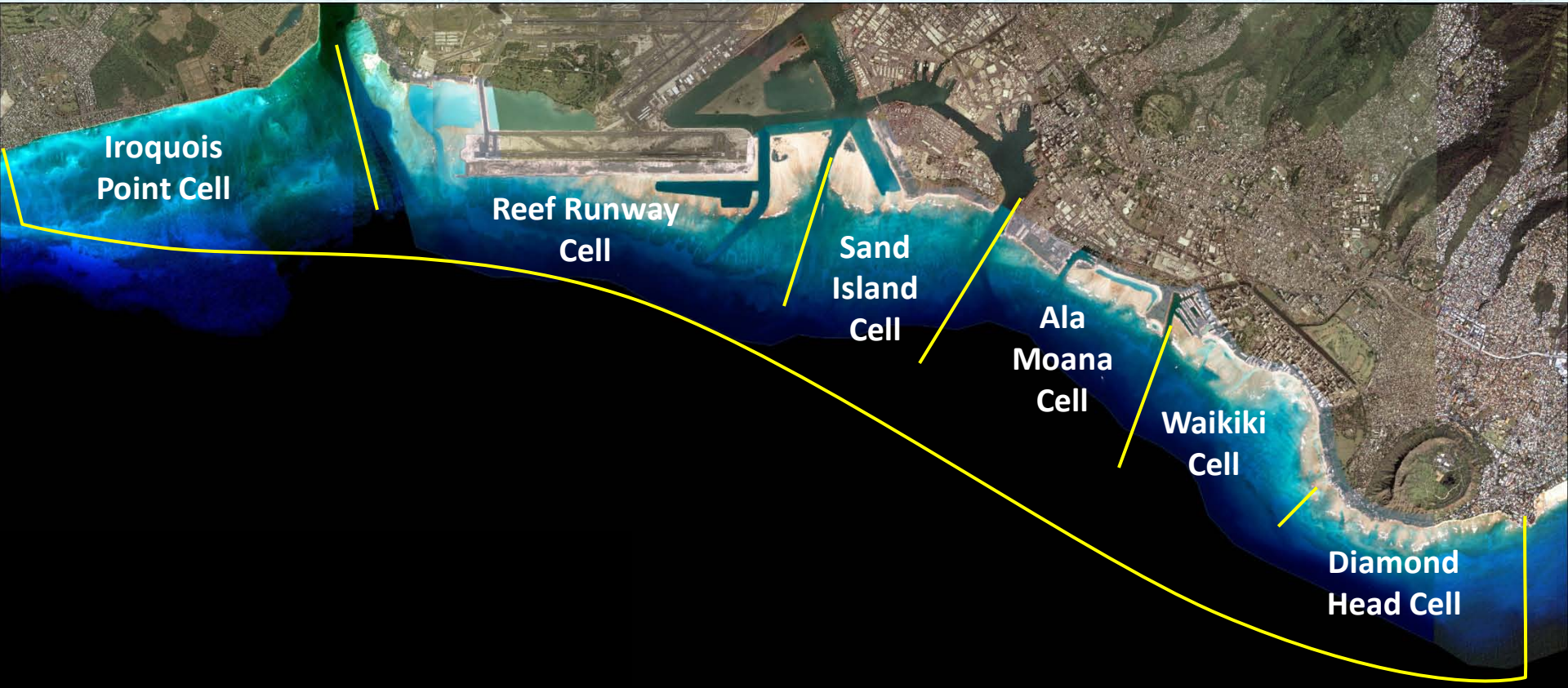
Littoral Cells in Study Area



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Methodology
Sources, Sinks, and Pathways

- **Sand sources**
  - Released by beach erosion: UH erosion hazard maps
  - Use 0.44 CY sand per SF of beach: UH/USGS beach profiles
  - Beach nourishment: Historical records for Waikiki, Ala Moana
  - Reef production: Process and volume poorly understood, estimated from reef area
- **Sand sinks**
  - Offshore losses balance sediment budget
  - Smaller losses: sea level rise, beach rock formation, etc.

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Methodology
Sources, Sinks, and Pathways

- **Sand Pathways**
  - Modeling by USACE at ERDC, POH
  - Earlier studies
- **Factors not included**
  - Seasonal effects: small based on profiles
  - Explicit modeling of transport rates: vastly overpredict rates for the sediment-starved beaches in the D2P region

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Sediment Budget by Littoral Cell

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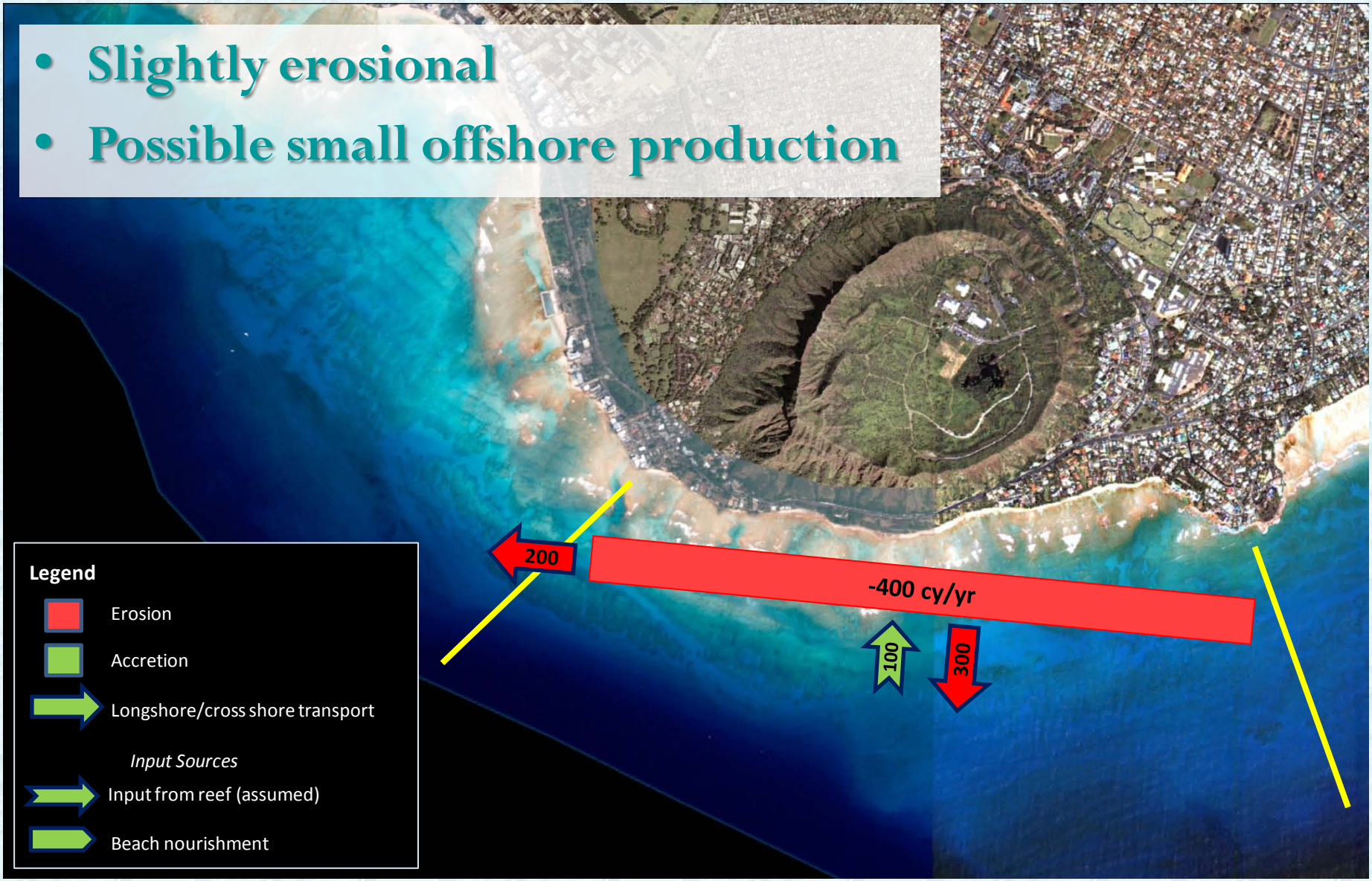
Diamond Head

- Slightly erosional
- Possible small offshore production



Waikiki

- **Highly urbanized and modernized beach**
- **Multiple littoral sub-cells can be identified**
- **Present analysis includes 3 sub-cells**
  - South of Natatorium
  - Central Waikiki
  - Halekulani – Fort DeRussy

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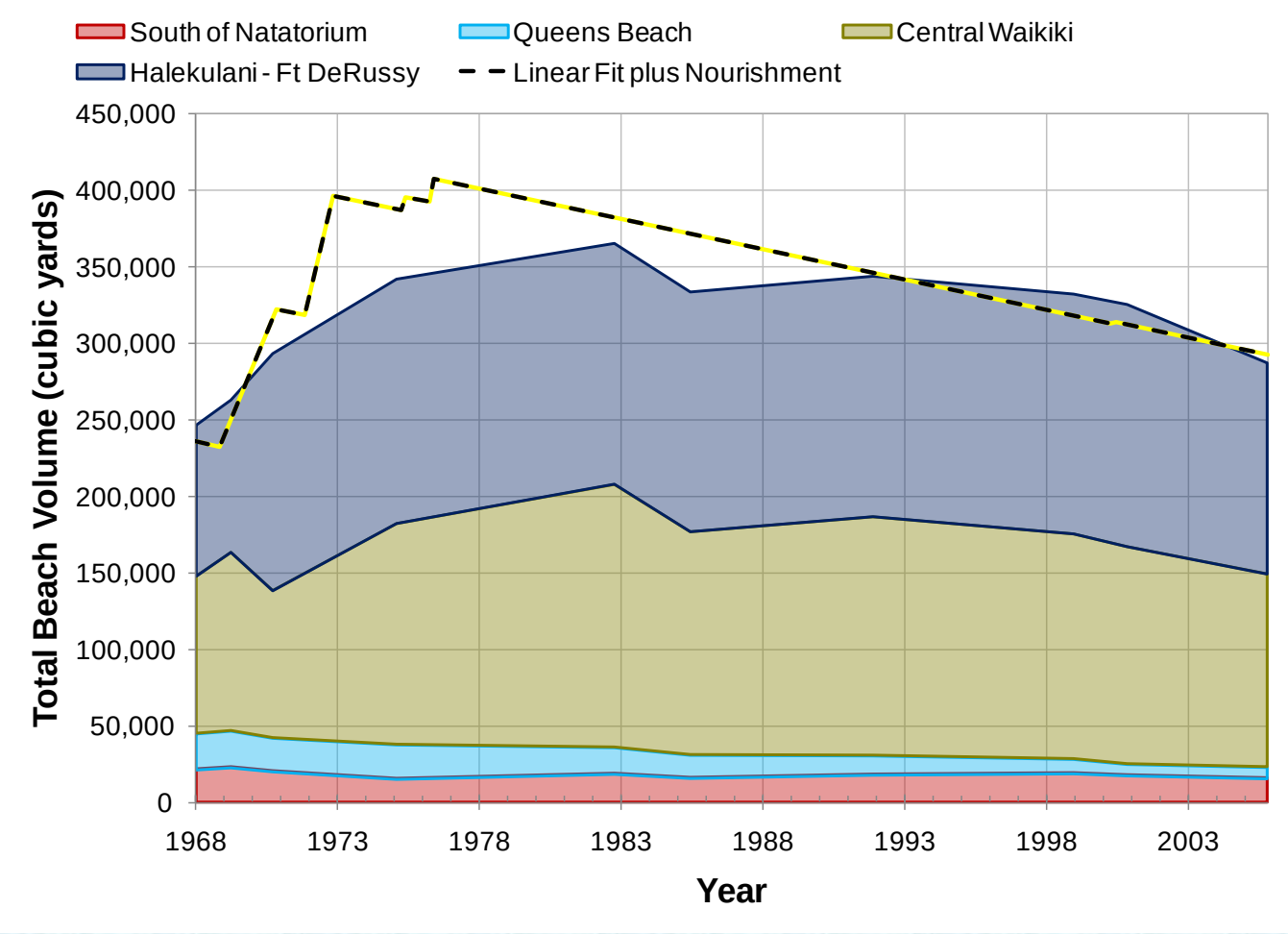
Waikiki

- Earlier beach growth due to nourishment reversed in recent years



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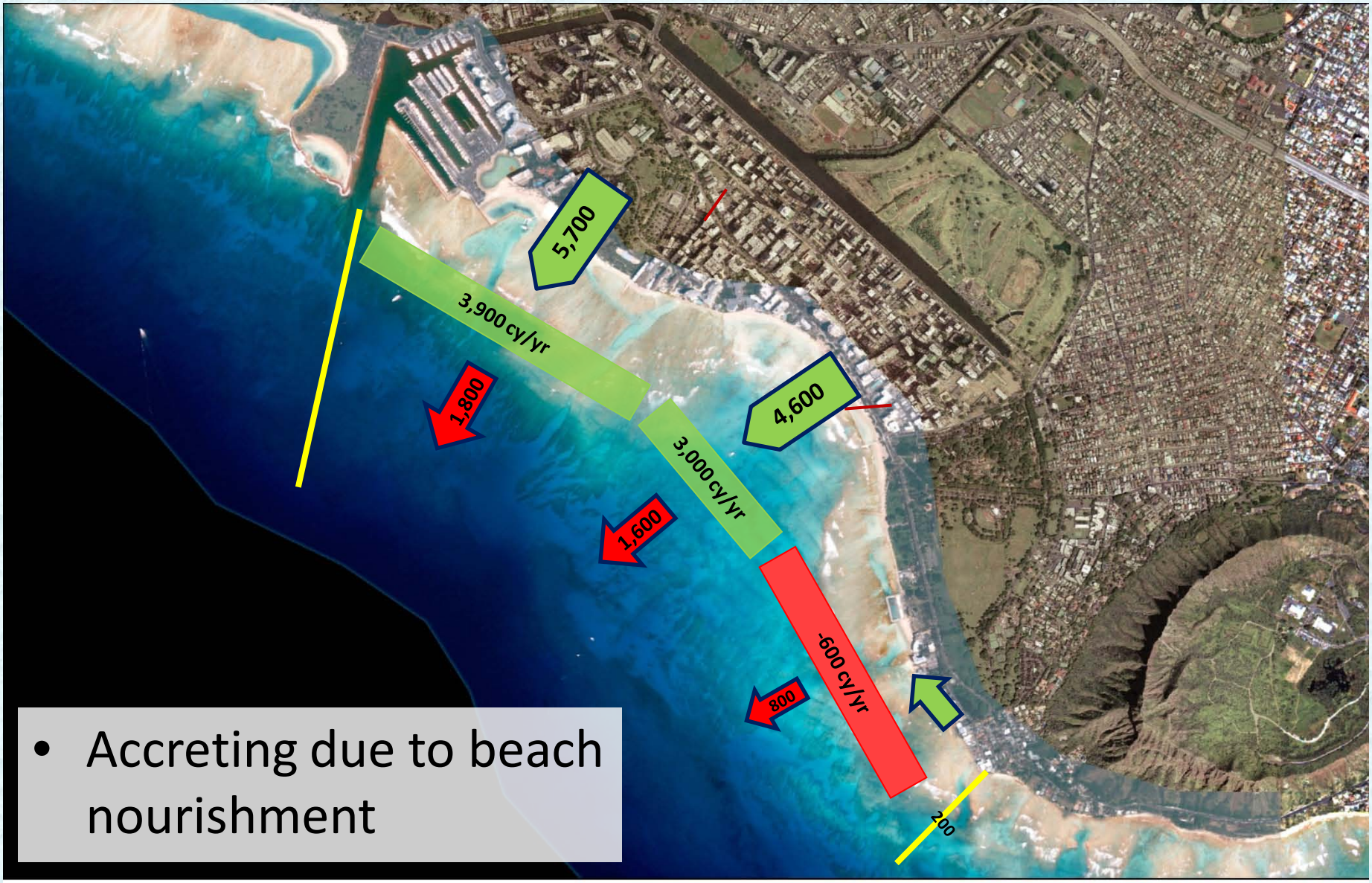
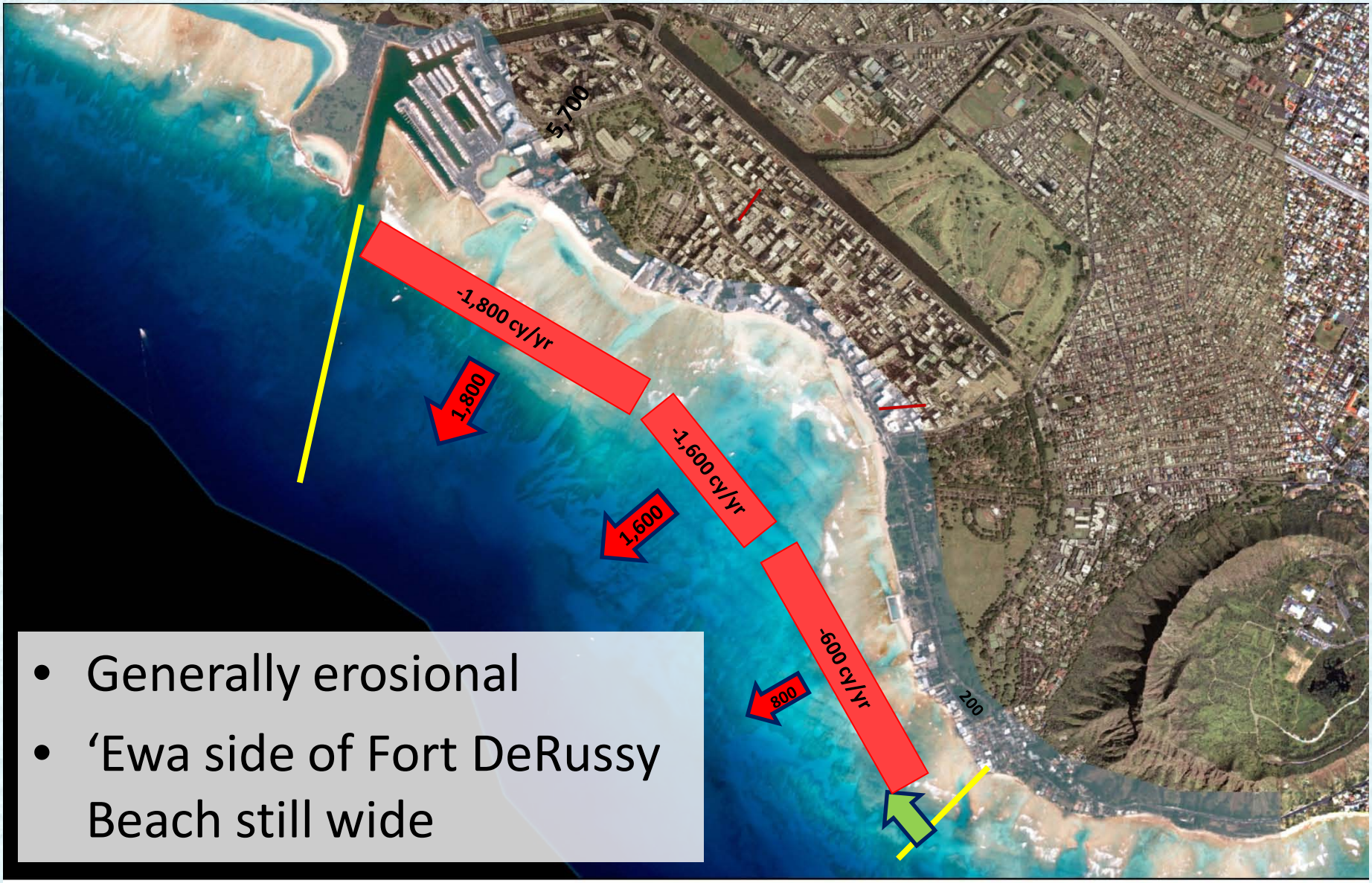
Waikiki – 1965 to 1985



- Accreting due to beach nourishment

Waikiki – 1985 to 2005



- Generally erosional
- ‘Ewa side of Fort DeRussy Beach still wide

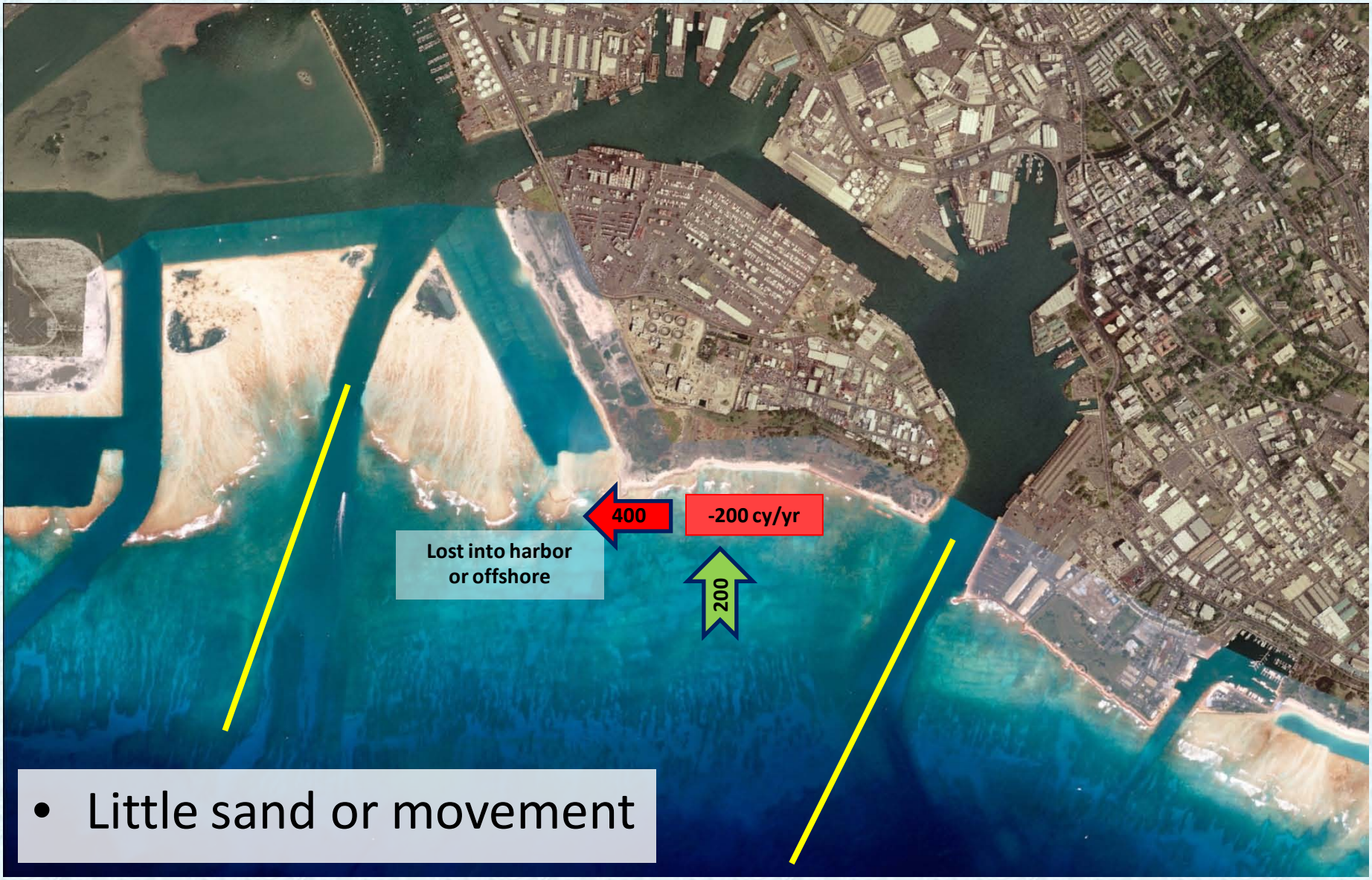
Ala Moana – 1965 to 1985

- Accreting due to beach nourishment

Ala Moana – 1985 to 2005

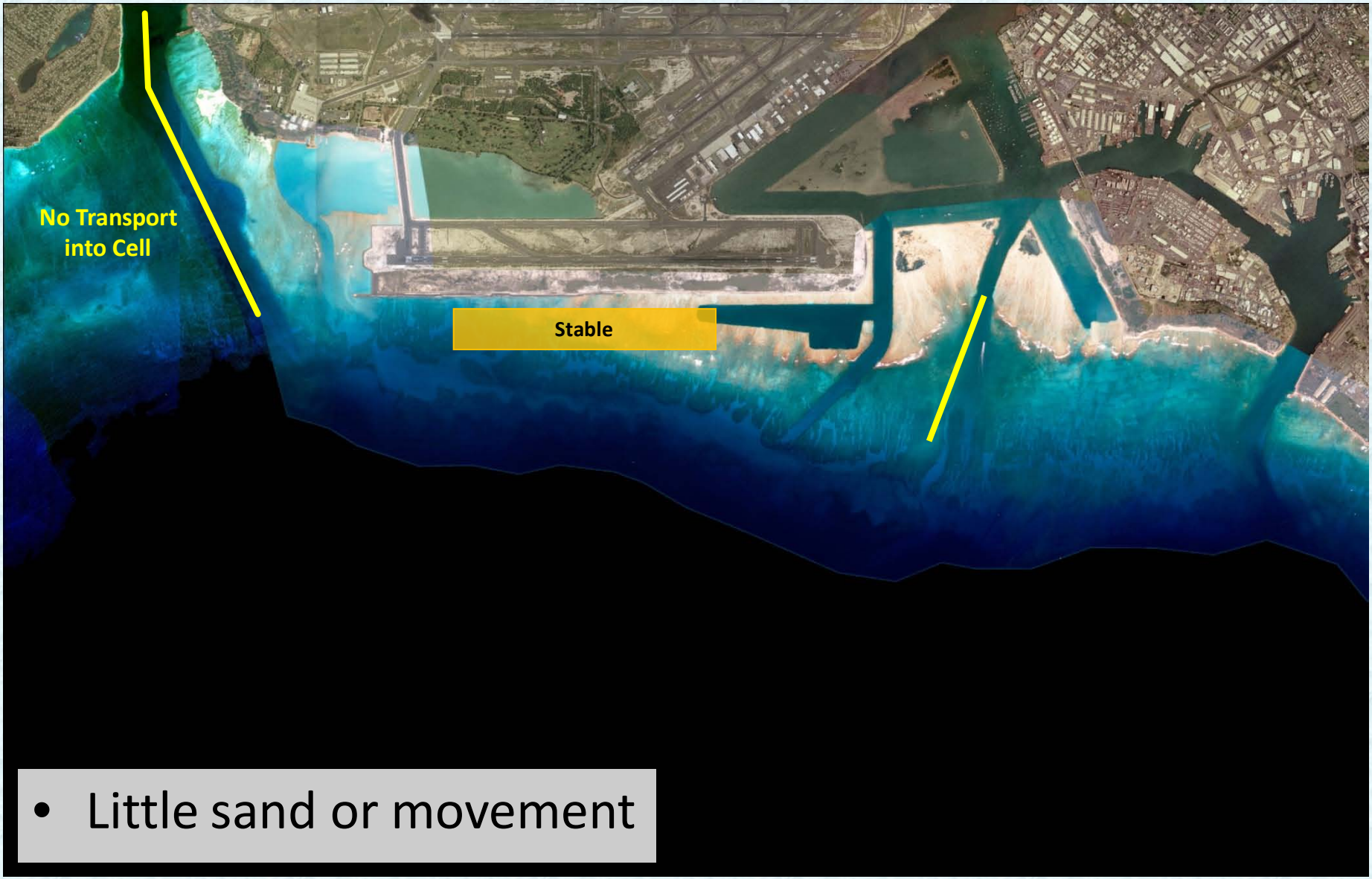
- Erosional

Sand Island



- Little sand or movement

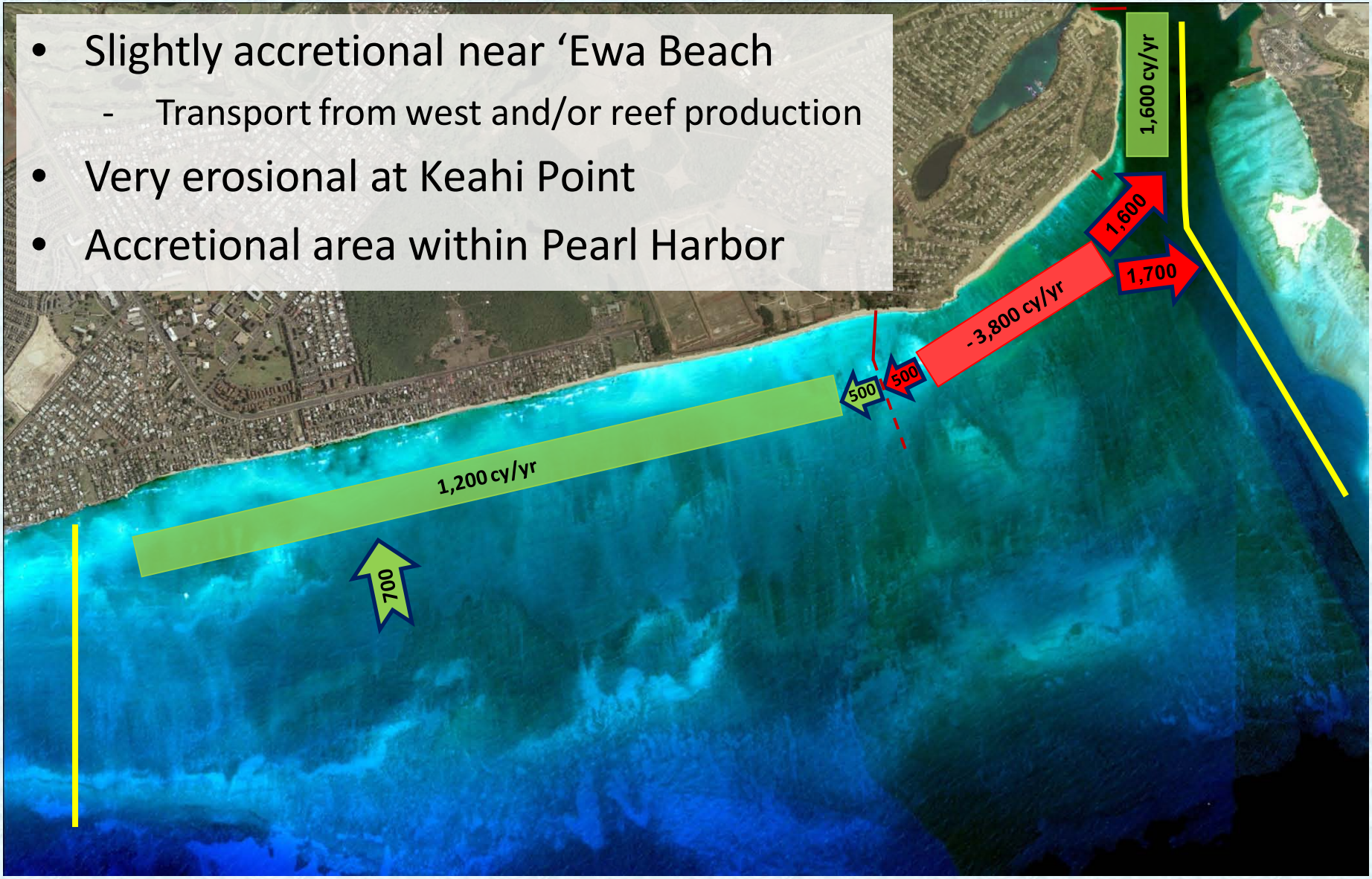
Reef Runway



- Little sand or movement

Iroquois Point

- Slightly accretional near ‘Ewa Beach
  - Transport from west and/or reef production
- Very erosional at Keahi Point
- Accretional area within Pearl Harbor



Summary

- **Diamond Head**
  - Slightly erosional, generally narrow beaches
- **Waikiki and Ala Moana**
  - Accretional before 1985 due to beach nourishment
  - Now erosional
  - Significant cross-shore transport

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Summary

- **Sand Island and Reef Runway**
  - Little sand (particularly at Reef Runway)
  - Low transport rates

- **Iroquois Point**
  - Combination of erosional and accretional areas
  - Extent of reef production unclear

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Recommendations for Further Study

- **All cells**
  - Continue routine aerial photography
  - Analyze potential climate change effects in detail
- **Diamond Head to Ala Moana**
  - Investigate sediment transport pathways
  - Cross-shore transport and circulation poorly understood
  - Field investigations recommended

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Recommendations for Further Study

- **Iroquois Point**
  - Investigate modern reef productivity: radiocarbon dating of beach sand
- **Honolulu Harbor, Pearl Harbor**
  - Sand sampling within harbors
  - Supplements sand circulation studies
  - May identify sand sources

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