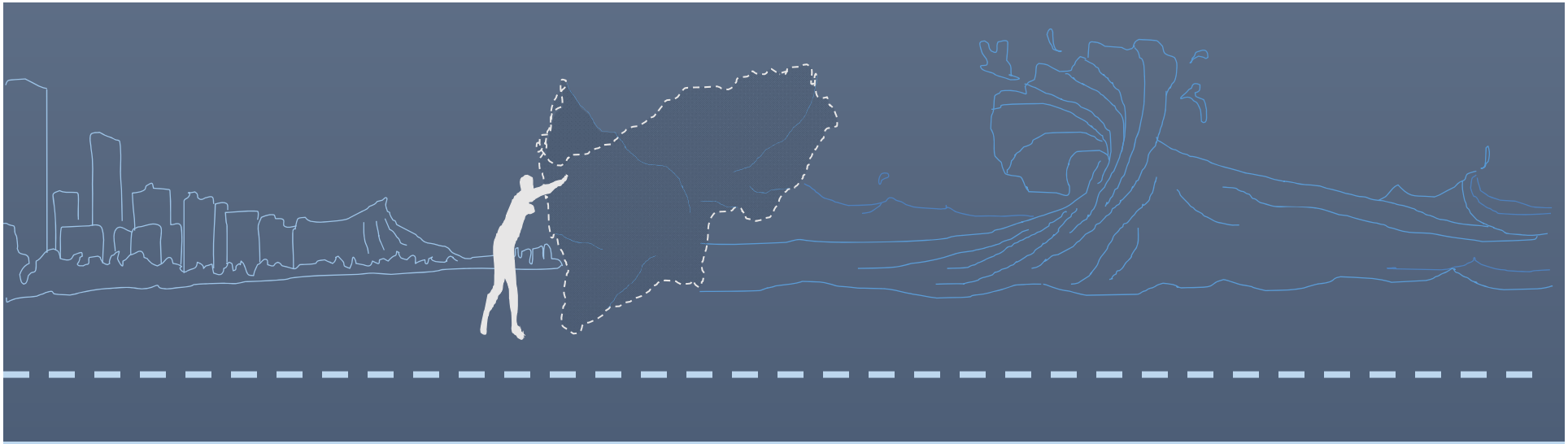


Sea Level Rise Vulnerability, Impacts, & Adaptation

Hawaii's Climate Adaptation Initiative

Dr. Catherine Courtney
Mr. Bill Bohn
Ms. Alison Andrews

TETRA TECH

Goal for this Presentation

- Provide an overview of the Hawai‘i Climate Adaptation Initiative (Act 83) and progress to date
- Stimulate your thinking about SLR adaptation for this afternoon and *beyond*

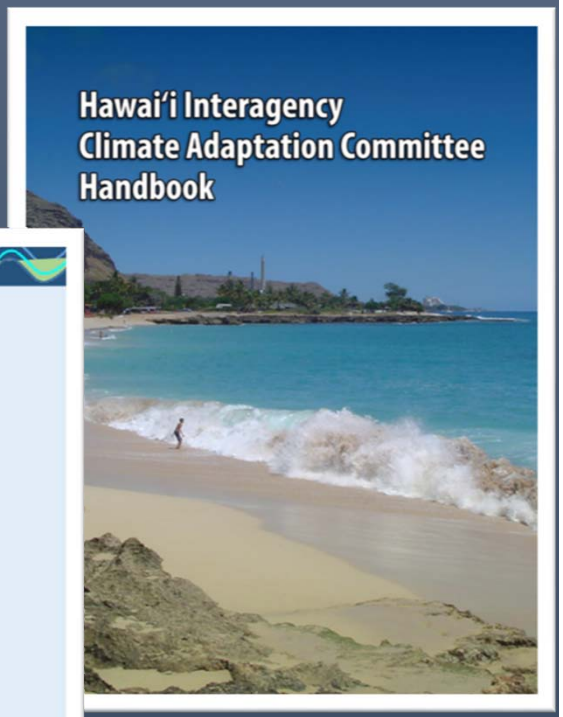
Hawai‘i Climate Adaptation Initiative Act

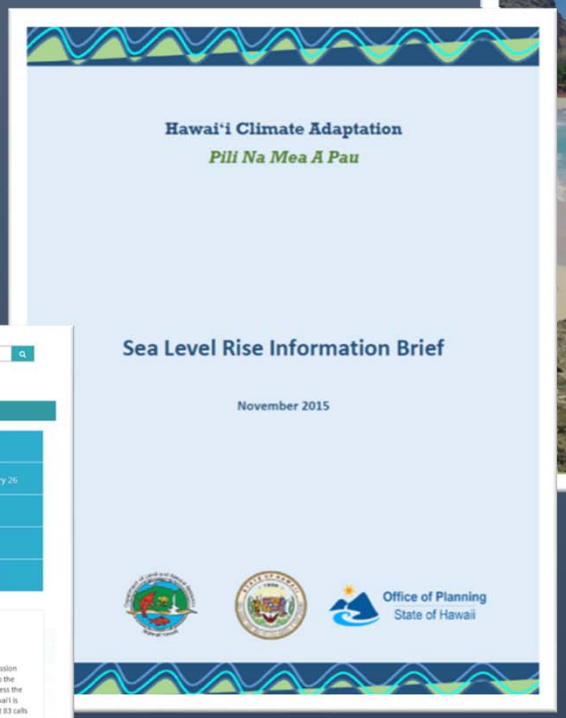
- **Climate Change:** potential to profoundly impact our wellbeing and way of life
- **Interagency Climate Adaptation Committee (ICAC):** long-term collaboration with an initial focus on SLR
- **Statewide SLR Vulnerability and Adaptation Report:** use best available science to assess risks state-wide and provide recommendations

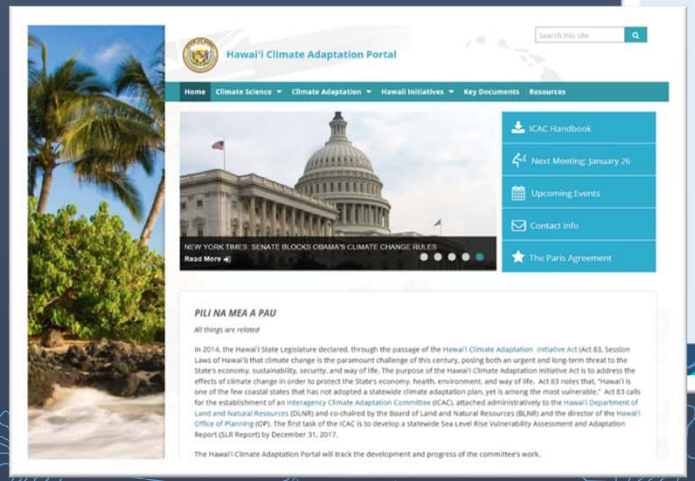
Hawai‘i Climate Adaptation Portal

http://climateadaptation.hawaii.gov/

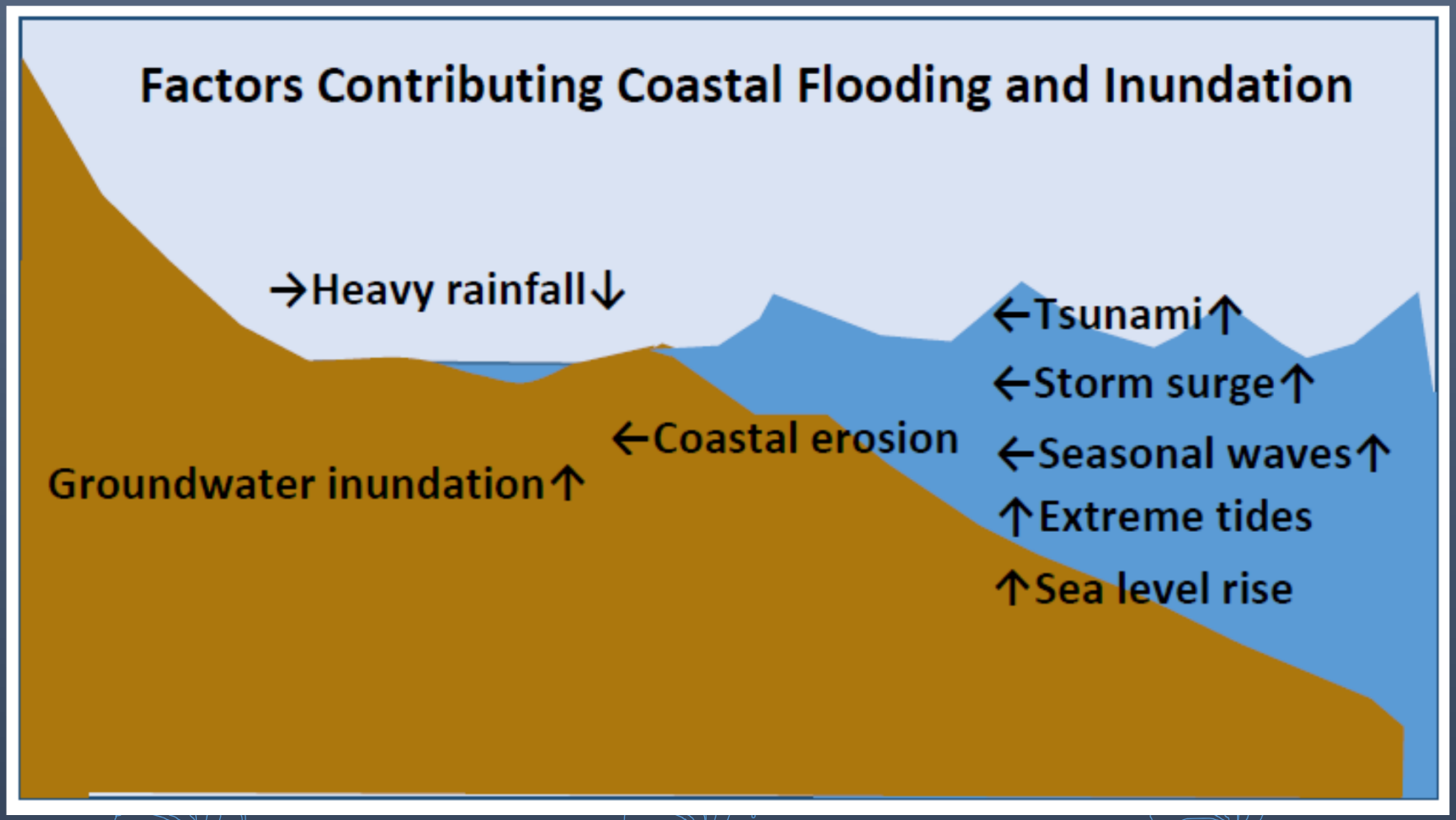
- ICAC Meeting Schedule
- Key Documents
- News feeds
- Resources
- Links







Sea level rise will exacerbate coastal hazards



Adopting a Multi-track Approach

Stakeholder Outreach/Engagement

- Literature review
- ICAC meetings
- Focus groups/Workshops
- SLR adaptation stories
- Public outreach/Listening sessions

Challenges & Recommendations

Risk Assessment

- Hazard modeling/ projections
- Vulnerability assessment
- Socioeconomic impact analysis

Risks from sea level rise

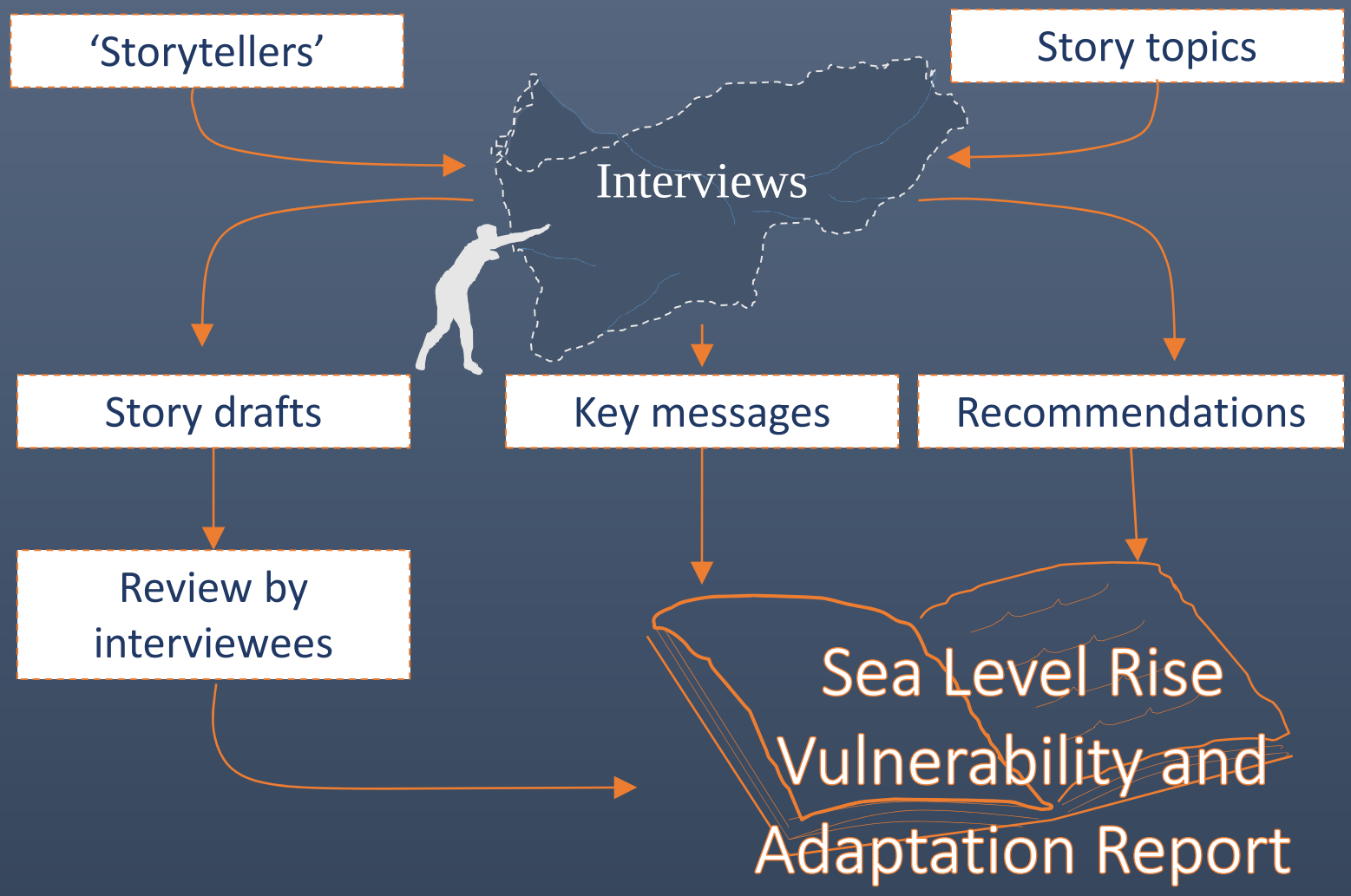
"Living" Outputs

Informed Constituency

SLR Report

Modeling/ GIS Database

Sea Level Rise Adaptation Stories



Kaua‘i County Story

- **Storyline:** The County is incorporating sea level rise into the General Plan update.
- **Key message:** Sea level rise adaptation can be addressed within existing planning frameworks to manage growth and new development in a changing climate

“Planning has to integrate science”

Michael Dahilig, Planning Director

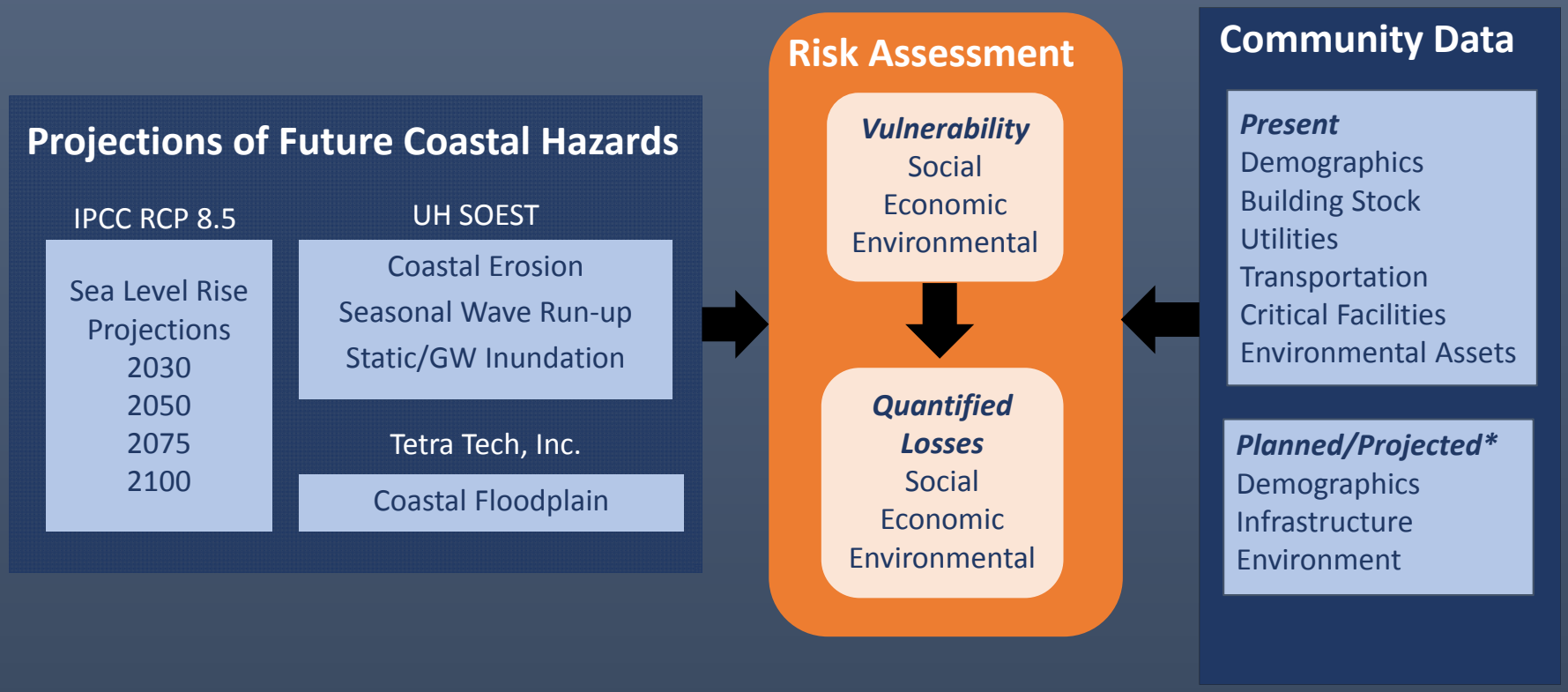
Ka‘ena Point Natural Area Reserve Story

- **Storyline:** Ka‘ena Point NAR can serve as a refuge for “climate migrants” from the NWHI
- **Recommendations:**
  - Expand refugia on the MHI working with the PMNM for coordinated conservation
  - Develop education and outreach

Bellows Air Force Station Story

- **Storyline:** Restoring and preserving sand dunes can help address erosion that threatens recreational and cultural areas
- **Key message:**
  - Engaging the community in coastal restoration fosters a connection to the land.

Projecting Future Risks from SLR



Risk (potential losses) = Probability x Consequence

100-Year Coastal Floodplain
Ewa Beach

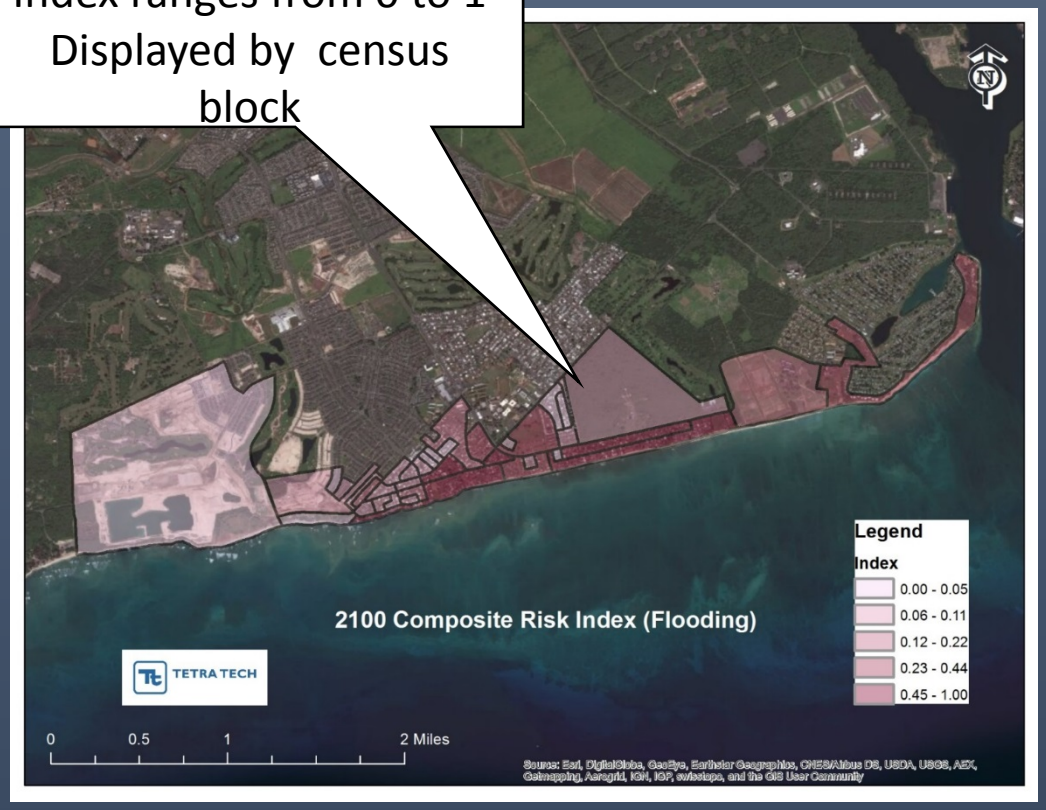
PRESENT

FUTURE (2100)

Flood Hazard Assessment Tool: http://gis.hawaiinfip.org/FHAT/

Risk Index: Coastal Flooding – 2100 Ewa Beach

Index ranges from 0 to 1
Displayed by census block



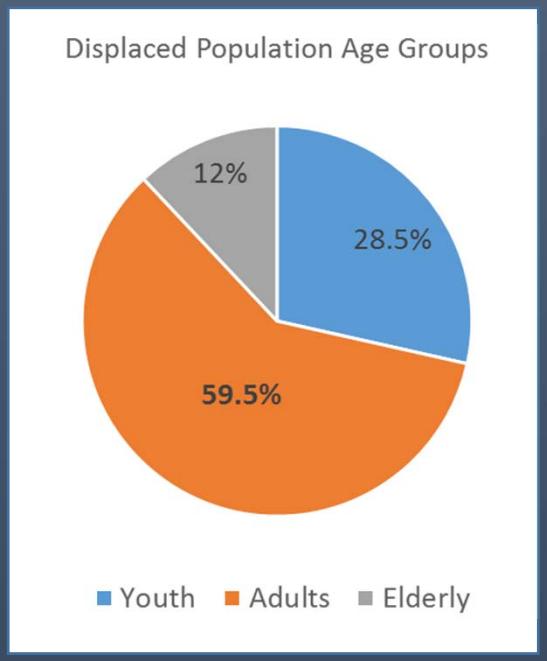
Composite Index of Variables

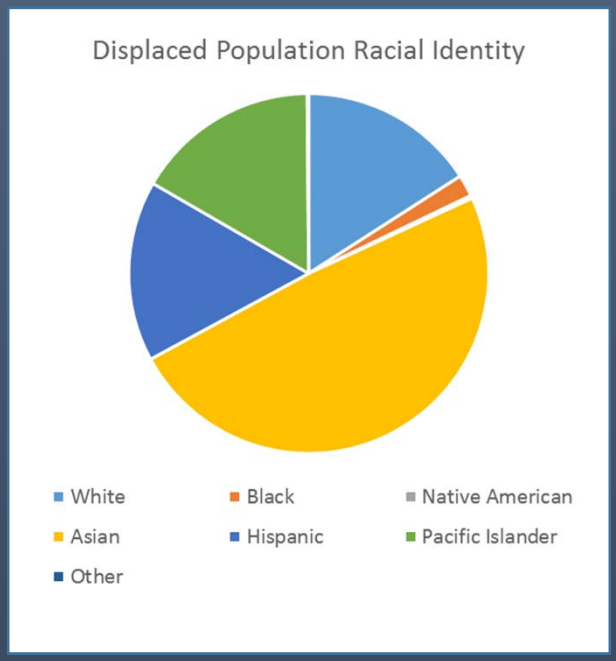
- Social (e.g. displaced population, low Income, elderly, disruption in basic services)
- Economic (e.g. commercial, residential, infrastructure losses)
- Environmental (e.g. HAZMAT facilities, beaches, wastewater)

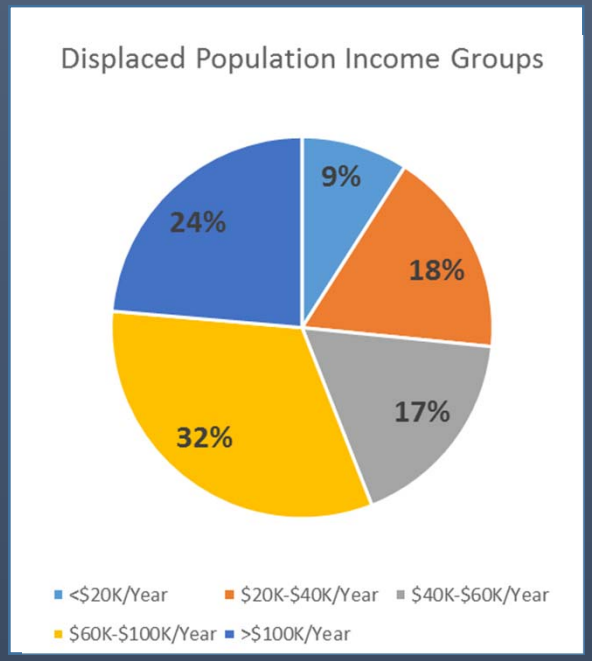
Displaced Population: Coastal Flooding – 2100, Ewa Beach

Displaced households (2100): 1295

Displaced population (2100): 5179



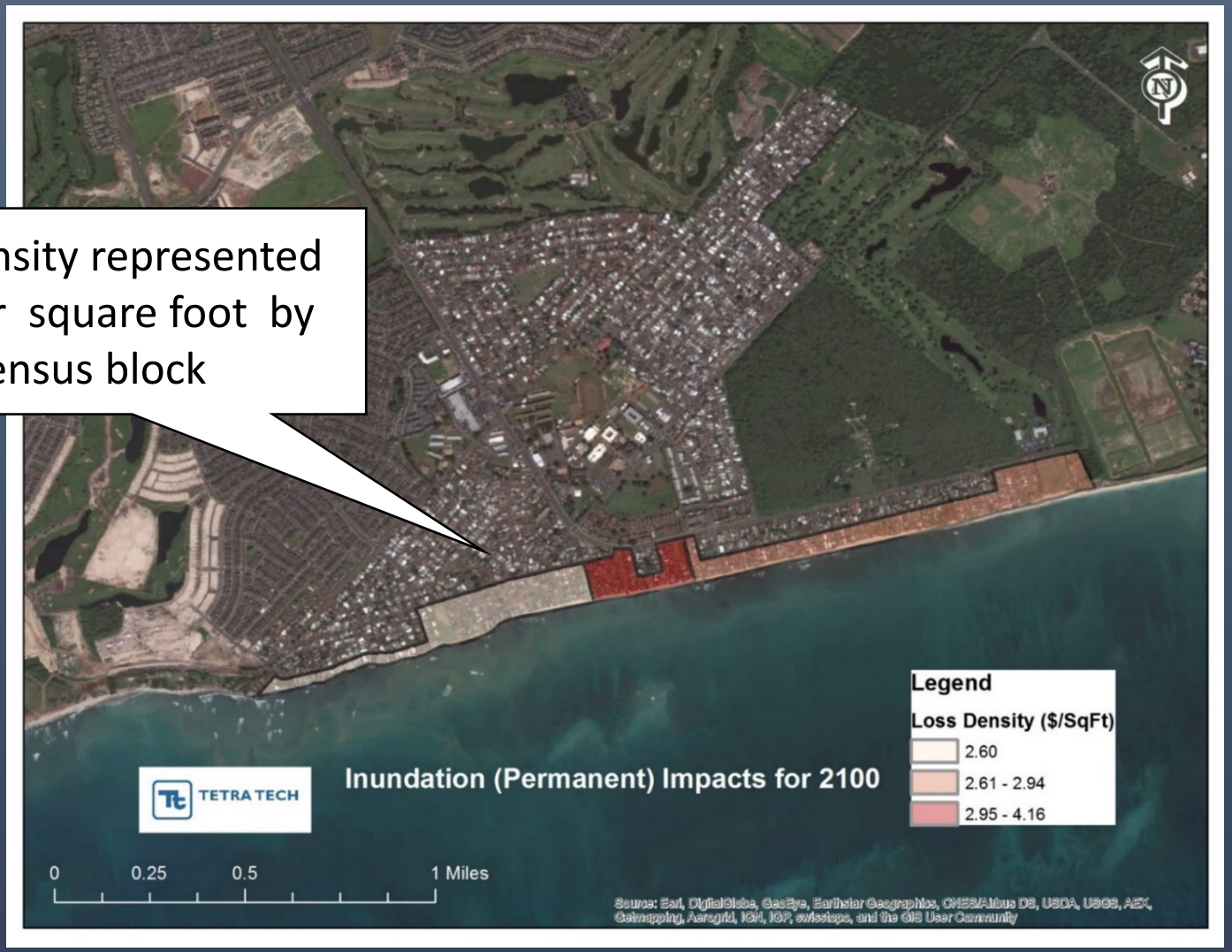




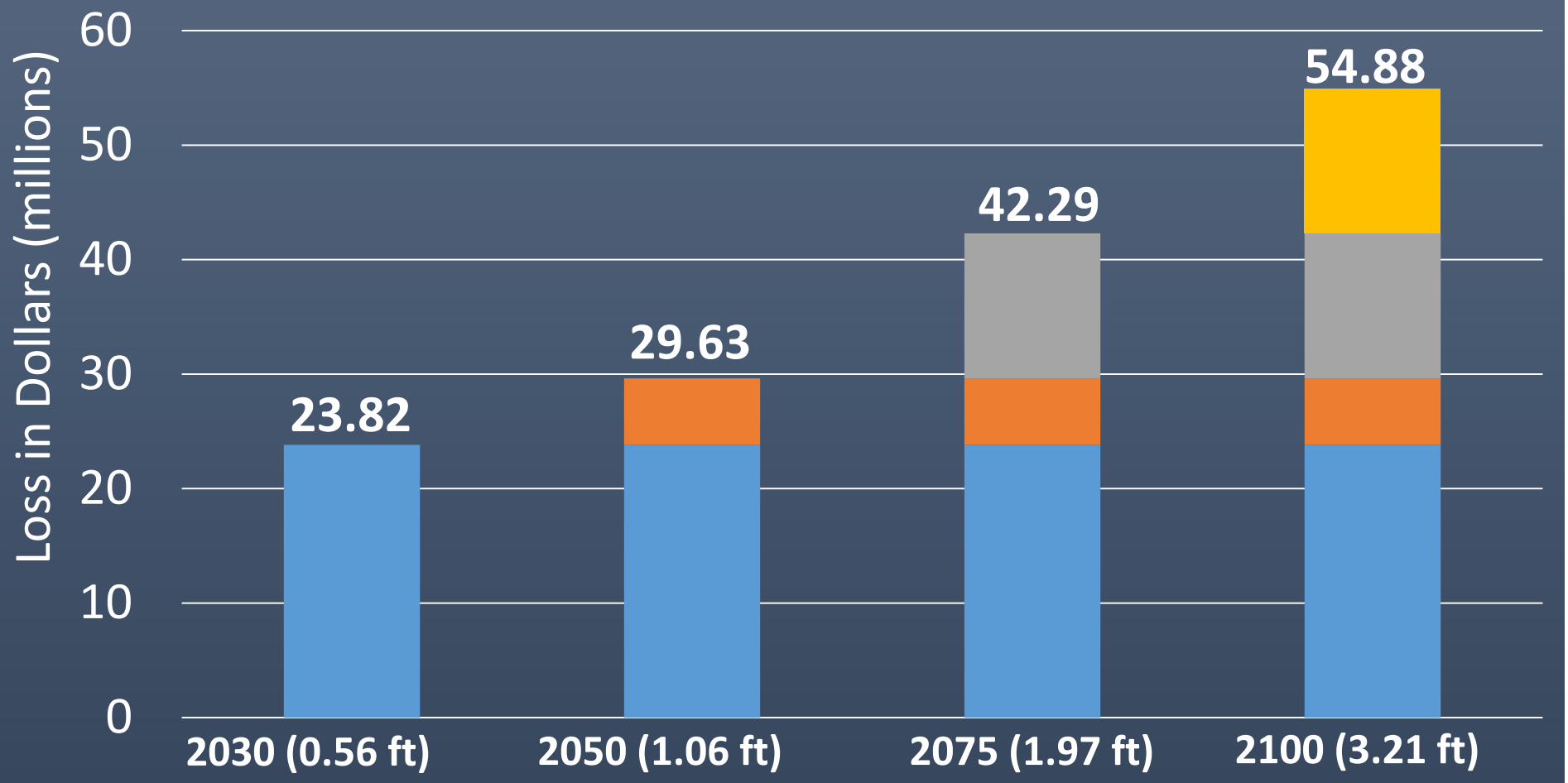
Coastal Erosion – 2100 (3.2 ft) Ewa Beach

Loss Density: Coastal Erosion - 2100 Ewa Beach

Loss density represented as $ per square foot by census block



Land and Building Loss: Coastal Erosion Ewa Beach



Total losses: 2100 (3.2 ft), Ewa Beach

Permanent Loss

- Static/groundwater inundation: $3.2M (2 structures)
- Coastal erosion: $51.3M (68 structures, 8.5 acres)

Temporary Loss

- Seasonal wave run-up: $10.2M (347 structures)
- 100-yr coastal floodplain: $56.7M (1308 structures)

Adaptation Strategies

Protection	• How do we prioritize which areas to protect with shoreline hardening?
Accommodation	• Do we accommodate new development through structural retrofits?
Planned Retreat	• Do we discourage development in high risk areas?
Preservation	• Which areas should be preserved for natural resource and habitat values?

Adaptation Tools – Existing, New, and Improved

- Hazard Mitigation Plans
- Community Development Plans
- General Plans
- Sector-based Plans

- Property Disclosure
- Erosion-based Shoreline Setbacks
- Rebuilding Restrictions
- Flood Insurance Rate Maps
- Environmental Review
- Natural Resources

Adaptation Tools – Existing, New, and Improved

- Capital Improvement Programs
- Land Acquisitions
- Conservation Easements
- Rolling Conservation Easements

- Community Rating System
- Mandatory Real Estate Disclosures
- Tax Incentives
- Transfer of Development Rights Programs

Governance that Anticipates Change

- **Ignite innovation:** building a broad constituency of empowered stakeholders
- **Commit to robust collaboration:** working together to address complex problems in a changing climate
- **Adopt an adaptive management approach:** test, monitor, and evaluate actions given uncertainties and long planning horizons

What will our SLR Report look like?

- **Envisioning the Future:** *A Call for Action*
- **Projecting Change:** *Global and Local Sea Level Rise*
- **Communicating Risks:** *Impacts to Hawaii's Coasts and Communities*
- **Innovating for Resilience:** *Recommended Strategies and Tools*
- **Anticipating Change:** *Recommended Institutional Arrangements and Governance*
- **Diving Deeper:** *Methodology, Assumptions, and Results*

Thank You!

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