GIS APPROACH TO THE VALUE OF COASTAL PROTECTION AND RISK: EVIDENCE FROM THE OREGON COAST

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VALUING COASTAL PROTECTION

Research Questions

- How do coastal housing markets value the ability to invest in protection from a hazard?
- Do markets value the ability to protect differently if there is exposure to multiple hazards?

Overview

- Model of Oregon Coast property values exploits clear variation in two protection/risk dimensions
- Results suggest that the value of the ability to protect from erosion (a chronic risk) is positive and significant , but that value diminishes with greater potential exposure to tsunami inundation (an acute risk)

Data Acquisition

In Bulk:

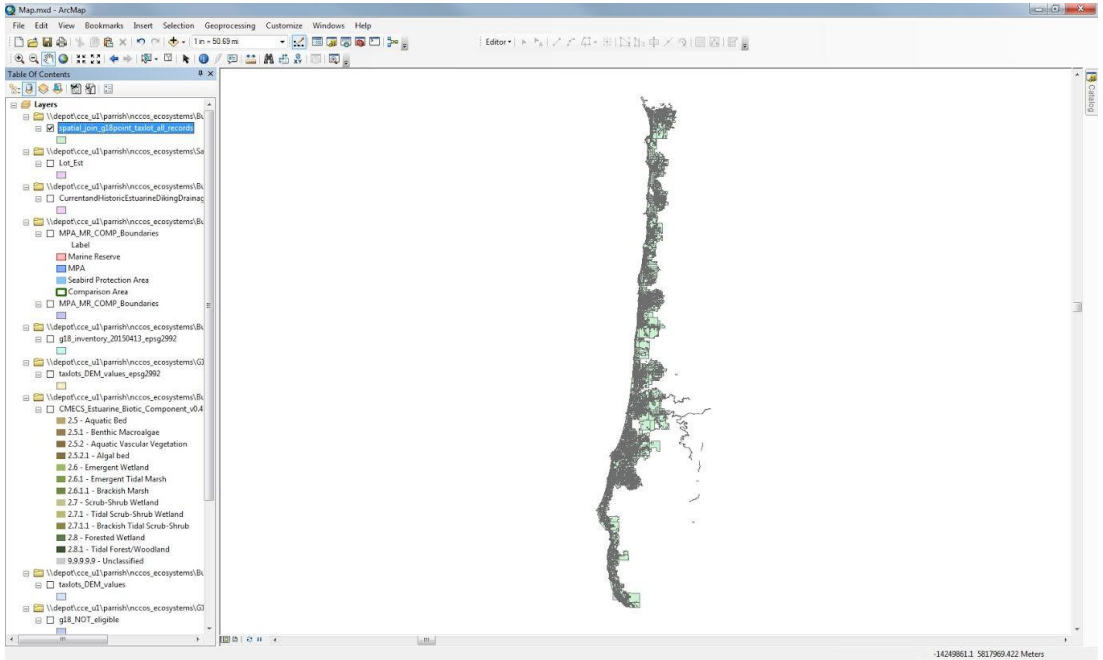
- Tax parcel data from CoreLogic / State of Oregon
- Elevation Data
- Tsunami Inundation
- Shoreline Structures
- G18 eligibility lots for coastal homes
- Flood Plains
- Universe of transactions in Oregon’s seven coastal counties 2004 – 2015 (Deed records from CoreLogic)

Data Acquisition

- Observations of sales of oceanfront housing in G18 eligibility zone from 2004 to 2015
  - Bedrooms, bathrooms, square footage, lot size, etc.
  - Risks: 100-year floodplain, tsunami zones, existing protective structures
  - Amenities: Distance to MHW, state park proximity

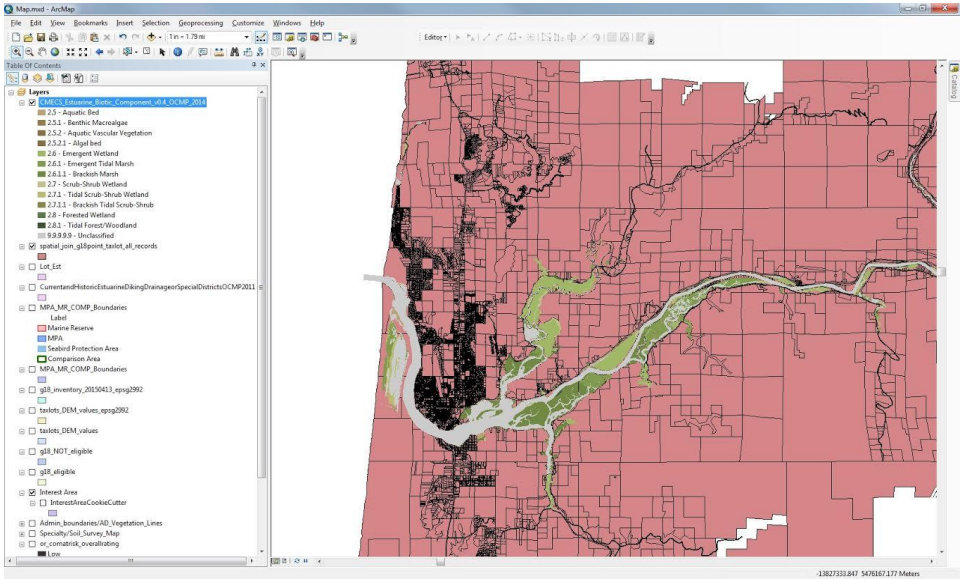
Defining Area of Interest

All lots within 5 miles of shoreline as defined by USGS were selected



Spatial Join

- Bulk Data was clipped to AOI
- Data spatial joined to the taxlot parcels
- Proximity information Calculated



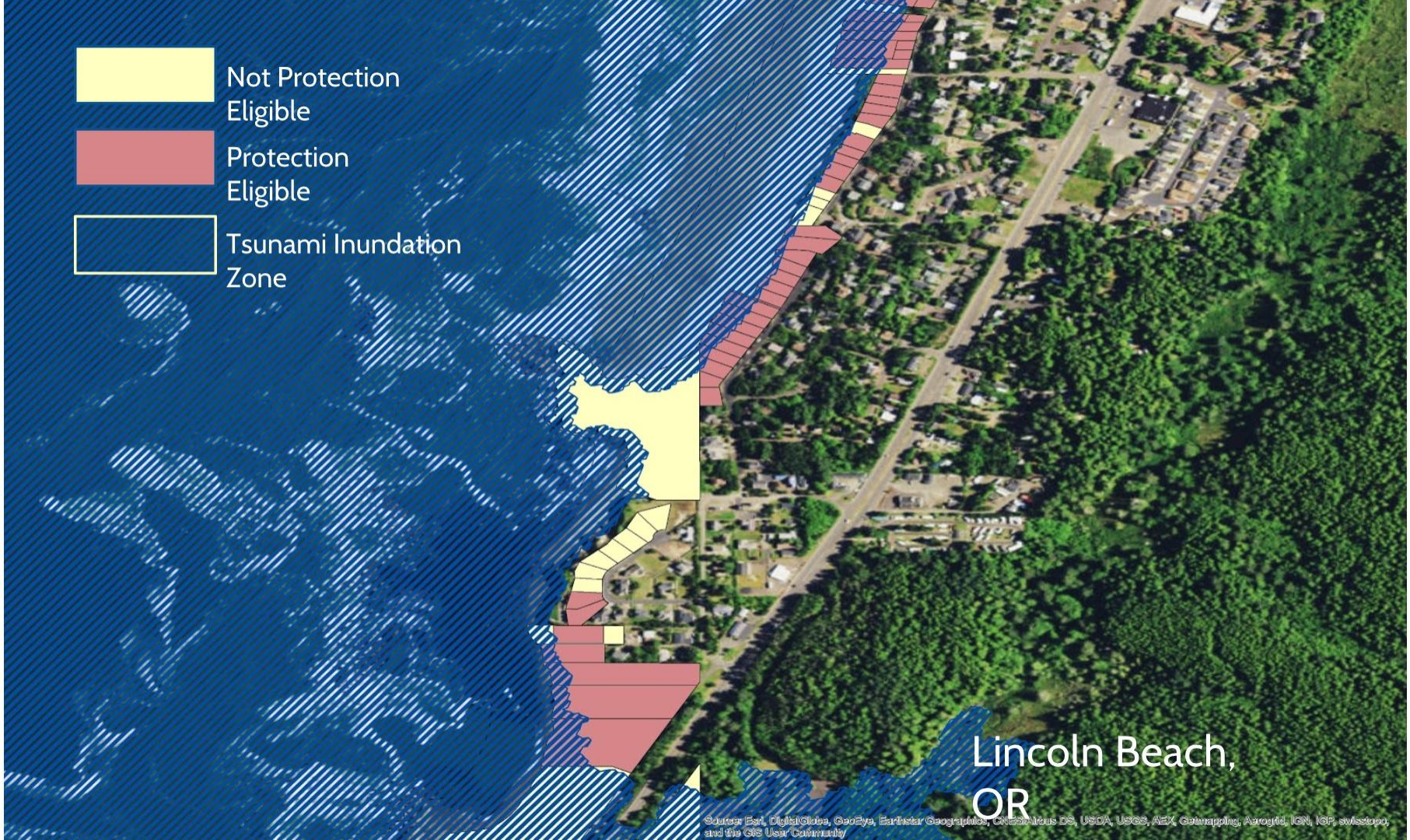
Empirical Setting

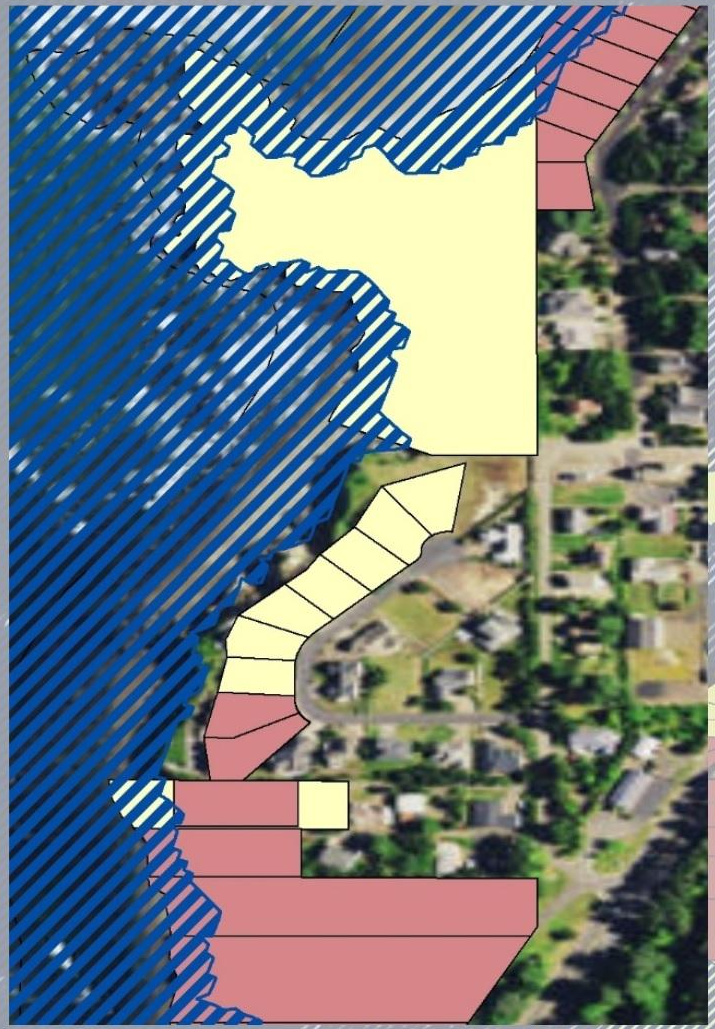
- Market: Oceanfront homes along the Oregon Coast
- Risk: Erosion
  - Goal 18 of Oregon Statewide Planning Goals & Guidelines
    - Permits for beachfront protective structures shall be issued only where development existed on January 1, 1977.

Erosion Risk: Rip-Rip Shoreline Protection

Empirical Setting

- Market: Oceanfront homes along the Oregon Coast
- Risk: Tsunami Inundation
  - Cascadia subduction zone runs for 700 miles off the coast of the Pacific NW
  - “Estimated chance in the next 50 years of a great subduction zone earthquake is between 10 and 20 %, assuming recurrence is on the order of 400 ± 200 years and last one was 300 years ago.” (1995 State of Oregon report)
  - Clear tsunami demarcation zones initially developed in 1995


Not Protection Eligible
Protection Eligible
Tsunami Inundation Zone
Lincoln Beach, OR
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Lincoln Beach, OR

Summary of Results

- Ability to protect property from erosion risk capitalizes significantly into oceanfront housing values. Results suggest 25.7 percent or ~$145,000.
- Capitalization is reduced 5.6 percent (~$32,000) for homes most vulnerable to tsunami inundation risk

Conclusions

- Empirical identification of the market value of the ability to invest in protect from a chronic risk
- Value is reduced when risk from a second acute hazard is elevated
- Future work: total economic value of coastal protection investments
    - These results will inform a dynamic model of investment in coastal infrastructure

Future Potential Uses

- Additional housing market analysis
- Estuary market housing market analysis
- Environmental survey development
- Environmentally sound land use models

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