Global Warming & Sea Level Rise

- Most warming over last 50 years attributable to human activities
- Sea Level Rise (SLR) average annual rate of 1 to 2 mm
  - Thermal Expansion
  - Non-polar glacier melt
  - Polar ice sheet melt

Source: IPCC Climate Change 2001
Sea Level Rise – Historical

- 3.12 mm/yr. (1.02 ft/century)
- 1902 - 1999

Source: NOAA Tides & Currents
Sea Level Rise – Historical

3.52mm/yr (1.15ft/century)
1943 - 1999

Source: NOAA Tides & Currents
Dorchester County, Maryland

- Facts
  - Delmarva Fox Squirrel
  - 39% of state wetlands, including Blackwater Refuge

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Why Dorchester?

- Titus & Richman 2000, SLR
- DNR, 2000 – SLR Response Strategy
- Availability of 2 Meter LIDAR (March 2003)
- Comprehensive Plan, 2006

Picture Source: Titus & Richman 2000
LIDAR

- 2M versus 30M
The MD Critical Area (CA) Program was created to protect the Chesapeake Bay through developmental regulations on or near the bay’s tidal shorelines.

“...all lands within 1000 feet of the mean high water line of tidal waters or the landward edge of tidal wetlands of the Chesapeake and Coastal Bays and their tidal tributaries.”

Satellite Imagery of the Chesapeake Bay. Source: www.pwconserve.org/photo/

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CA 100 Foot Buffer Zone

- 100 feet landward of the mean high water line is designated as a protected “aquatic resources” area
- Includes tidal waters, tributary streams and tidal wetlands
- Intended to protect vital plant and animal habitat
- In areas of steep slope or erodible soils the buffer may be expanded beyond 100 feet.

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Methods

- Convert .e00 files to ESRI Grid
- Merge Grids in Arc Grid
- Convert two large Grids to Imagine files
- Merge two imagine files to one final Grid
- Reclass
  - Two scenarios
    - High (3ft/century)
    - Low (1ft/century)
## SLR Modeling Scenarios

<table>
<thead>
<tr>
<th></th>
<th>25 Year</th>
<th>50 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>3 inches</td>
<td>6 inches</td>
</tr>
<tr>
<td>High</td>
<td>9 inches</td>
<td>18 inches</td>
</tr>
</tbody>
</table>

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Data Generation

- Development of 1000 Foot Boundary
- Development of 100 Foot Buffer

Cross Tabulation:
- County-wide
- 1000 Foot Boundary
- 100 Foot Buffer
Findings

Dorchester County Land Use

Legend:
- Residential
- Commercial
- Agriculture
- Industrial
- Water
- Institutions
- Other

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Findings

Dorchester County Land Use

Dorchester County Land Use Inundation
Where Sea Level Rise = 9 inches in 25 years

Legend
- Residential
- Commercial
- Agricultural
- Industrial
- Public
- Institutional
- Forest
- Water Areas
- Water

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## Findings

### Total Affected Area Including Wetlands -- High Scenario (in Acres)

<table>
<thead>
<tr>
<th>LULC</th>
<th>Total for County</th>
<th>25 Years</th>
<th>% Inundated</th>
<th>50 Years</th>
<th>% Inundated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>12,892</td>
<td>143.45</td>
<td>1.11%</td>
<td>739.55</td>
<td>5.74%</td>
</tr>
<tr>
<td>Commercial</td>
<td>2,069</td>
<td>41.38</td>
<td>2.00%</td>
<td>125.24</td>
<td>6.05%</td>
</tr>
<tr>
<td>Industrial</td>
<td>937</td>
<td>8.89</td>
<td>0.95%</td>
<td>39.1</td>
<td>4.17%</td>
</tr>
<tr>
<td>Institutional</td>
<td>982</td>
<td>3.42</td>
<td>0.35%</td>
<td>22.94</td>
<td>2.34%</td>
</tr>
<tr>
<td>Open Space</td>
<td>662</td>
<td>0.75</td>
<td>0.11%</td>
<td>2.21</td>
<td>0.33%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>119,817</td>
<td>1,124.03</td>
<td>0.94%</td>
<td>4,403.33</td>
<td>3.68%</td>
</tr>
<tr>
<td>Forest</td>
<td>118,717</td>
<td>8,737.43</td>
<td>7.36%</td>
<td>24,932.57</td>
<td>21.00%</td>
</tr>
<tr>
<td>Shrub Areas</td>
<td>7,999</td>
<td>310.59</td>
<td>3.88%</td>
<td>1,113.75</td>
<td>13.92%</td>
</tr>
<tr>
<td>Wetlands</td>
<td>91,002</td>
<td>29,314.11</td>
<td>32.21%</td>
<td>59,708.07</td>
<td>65.61%</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td><strong>355,076</strong></td>
<td><strong>39,684.05</strong></td>
<td><strong>11.18%</strong></td>
<td><strong>91,086.76</strong></td>
<td><strong>25.65%</strong></td>
</tr>
</tbody>
</table>

**Countywide Inundated Forest Areas Where SLR = 18” in 50 Years**

<table>
<thead>
<tr>
<th>Forest Area</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Forest Countywide</td>
<td>114,000.00</td>
</tr>
<tr>
<td>Inundated Forest Countywide</td>
<td>65,000.00</td>
</tr>
</tbody>
</table>
## Findings

<table>
<thead>
<tr>
<th>LULC</th>
<th>Total for County</th>
<th>25 Years</th>
<th>% Inundated</th>
<th>50 Years</th>
<th>% Inundated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>9,781</td>
<td>142.45</td>
<td>1.46%</td>
<td>732.26</td>
<td>7.49%</td>
</tr>
<tr>
<td>Commercial</td>
<td>1,577</td>
<td>41.16</td>
<td>2.61%</td>
<td>125.16</td>
<td>7.94%</td>
</tr>
<tr>
<td>Industrial</td>
<td>540</td>
<td>8.98</td>
<td>1.66%</td>
<td>39.16</td>
<td>7.25%</td>
</tr>
<tr>
<td>Institutional</td>
<td>567</td>
<td>3.37</td>
<td>0.59%</td>
<td>21.74</td>
<td>3.84%</td>
</tr>
<tr>
<td>Open Space</td>
<td>393</td>
<td>0.76</td>
<td>0.19%</td>
<td>2.23</td>
<td>0.57%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>69,077</td>
<td>1,022.40</td>
<td>1.48%</td>
<td>3,900.50</td>
<td>5.65%</td>
</tr>
<tr>
<td>Forest</td>
<td>75,446</td>
<td>8,348.53</td>
<td>11.07%</td>
<td>23,322.92</td>
<td>30.91%</td>
</tr>
<tr>
<td>Shrub Areas</td>
<td>5,016</td>
<td>306.74</td>
<td>6.12%</td>
<td>1,062.14</td>
<td>21.18%</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>162,397</strong></td>
<td><strong>9,874</strong></td>
<td><strong>6.08%</strong></td>
<td><strong>29,206</strong></td>
<td><strong>17.98%</strong></td>
</tr>
</tbody>
</table>

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Findings

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1,109</td>
<td>66.19</td>
<td>5.97%</td>
<td>226.8</td>
<td>20.46%</td>
</tr>
<tr>
<td>Commercial</td>
<td>171</td>
<td>13.18</td>
<td>7.70%</td>
<td>34.99</td>
<td>20.43%</td>
</tr>
<tr>
<td>Industrial</td>
<td>46</td>
<td>3.96</td>
<td>8.59%</td>
<td>13.44</td>
<td>29.15%</td>
</tr>
<tr>
<td>Institutional</td>
<td>28</td>
<td>1.03</td>
<td>3.73%</td>
<td>4.66</td>
<td>16.86%</td>
</tr>
<tr>
<td>Open Space</td>
<td>16</td>
<td>0.41</td>
<td>2.53%</td>
<td>0.74</td>
<td>4.57%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>4,404</td>
<td>327.44</td>
<td>7.44%</td>
<td>891.56</td>
<td>20.25%</td>
</tr>
<tr>
<td>Forest</td>
<td>5,604</td>
<td>1,153.72</td>
<td>20.59%</td>
<td>2,910.38</td>
<td>51.93%</td>
</tr>
<tr>
<td>Shrub Areas</td>
<td>358</td>
<td>50.8</td>
<td>14.21%</td>
<td>141.03</td>
<td>39.44%</td>
</tr>
<tr>
<td>Totals</td>
<td>11,735</td>
<td>1,617</td>
<td>13.78%</td>
<td>4,224</td>
<td>35.99%</td>
</tr>
</tbody>
</table>

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Limitations of Data

- DEM and shoreline
- County boundary and new shoreline
- Maryland Department of Planning Land Use
- Findings are valid for general purposes
Recommendations

Technical Recommendations:
- Complete LIDAR dataset
- Develop current shoreline data
- Develop current land use based on high resolution aerial photography
- Updated Critical Area 1000 Foot Jurisdictional Boundary

Further information:
- Strategies of sea level rise impact mitigation: http://shorelines.dnr.state.md.us/

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