





• All dollar amounts are in 2010 dollars.

- The cost of BPS construction and maintenance are set at \$125 per vertical foot in elevation by lineal foot in length.
- Costs for DRP construction and maintenance are the same as beach nourishment (\$13/m³). • Maintenance costs of BPS and DRP are estimated each year plus the potential additional cost
- of raising/rebuilding the structure (if necessary).
- BPS and DRP are eligible to be maintained every 3 years if necessary.



Take Home Messages:

- In the Baseline scenario, costs are limited to beach nourishment fronting the small number of existing BPS. Demand for the this policy is completely met by the allocated budget.
- In the Realign scenario, costs are distributed between raising and relocating buildings exposed to flood hazards and removing buildings with the FEMA Flood Hazard Zone that are impacted by flooding. Unmet demand for these actions begins towards the end of the century due to a small number of high cost projects (very expensive buildings).
- In the Protect scenario, hazards initiate significant construction of BPS and the budget caps begin to be reached. Over time, nourishment projects become more prevalent than BPS construction.
- In the Restore scenario, both expenditures and unmet demand are dominated by construction of DRPs. Demand for beach nourishment projects in front of DRPs (when necessary) are fully met with assumed budget allocation model.



GRAYS HARBOR COUNTY COASTAL FUTURES PROJECT: Recap, Results and Next Steps Meeting

Budget allocation, hazard induced costs, and tradeoffs

- Based on excellent feedback received at our last meeting, we modified the model by implementing budget caps: • This prevents unlimited spending by capping annual expenditures to a user specified amount (currently set to \$2 million dollars based on a simple sensitivity test).
- Annually, the budget is allocated between various policies based on the demand for each individual action and the recent expenditure history. A floor of at least \$100,000/year is set for each individual policy action.





Take Home Messages:

- Coastal flooding induced damages are more costly than erosion induced damages under the low and high climate impact scenario. However, for the worst case climate impact scenario erosion induced damages are more costly.
- Erosion induced damages, in particular, are sensitive to policy choices with the Protect scenario significantly reducing losses. Coastal flooding is less sensitive to policy scenarios, with Realign policies reducing damages the most.
- Damages scale with climate change impact scenario. For erosion, the worst case scenario is more than 15 times more costly than the low climate impact scenario, while for flooding the worst case is about 4 times more costly.



Annual cost of Flooded Buildings

- BPS reconstruction is triggered under a specific set of instances: BPS protects development AND
- The current BPS hasn't been maintained in the past 3 years AND
- The BPS was flooded 2 out of the last 5 years.

wide).

Take Home Messages:

- The range of costs for constructing BPS in the **Protect** scenario is sensitive to **both** climate impact scenario **and** the budget allocation model resulting in rich model behavior.
- ultimately independent of climate change scenario. • Costs associated with maintenance of DRPs in the **Restore** scenario scale with climate change impact scenario and increase through time.
- The cost to remove buildings (via easements) in the **Realign** policy scenario varies significantly across climate scenarios, but overall **increases** through time (Figure 15).
- the assumptions in the hazard allocation model.
- All of the hazard induced costs and associated tradeoffs shown on this poster are sensitive to



The cost of removing a home from the FEMA Flood Hazard Zone is equal to half the relocated property's value in 2010 dollars.





• Construction of DRPs dominate costs in the **Restore** scenario with each climate change impact scenario maximizing the potential budge allocation, therefore these expenditures are