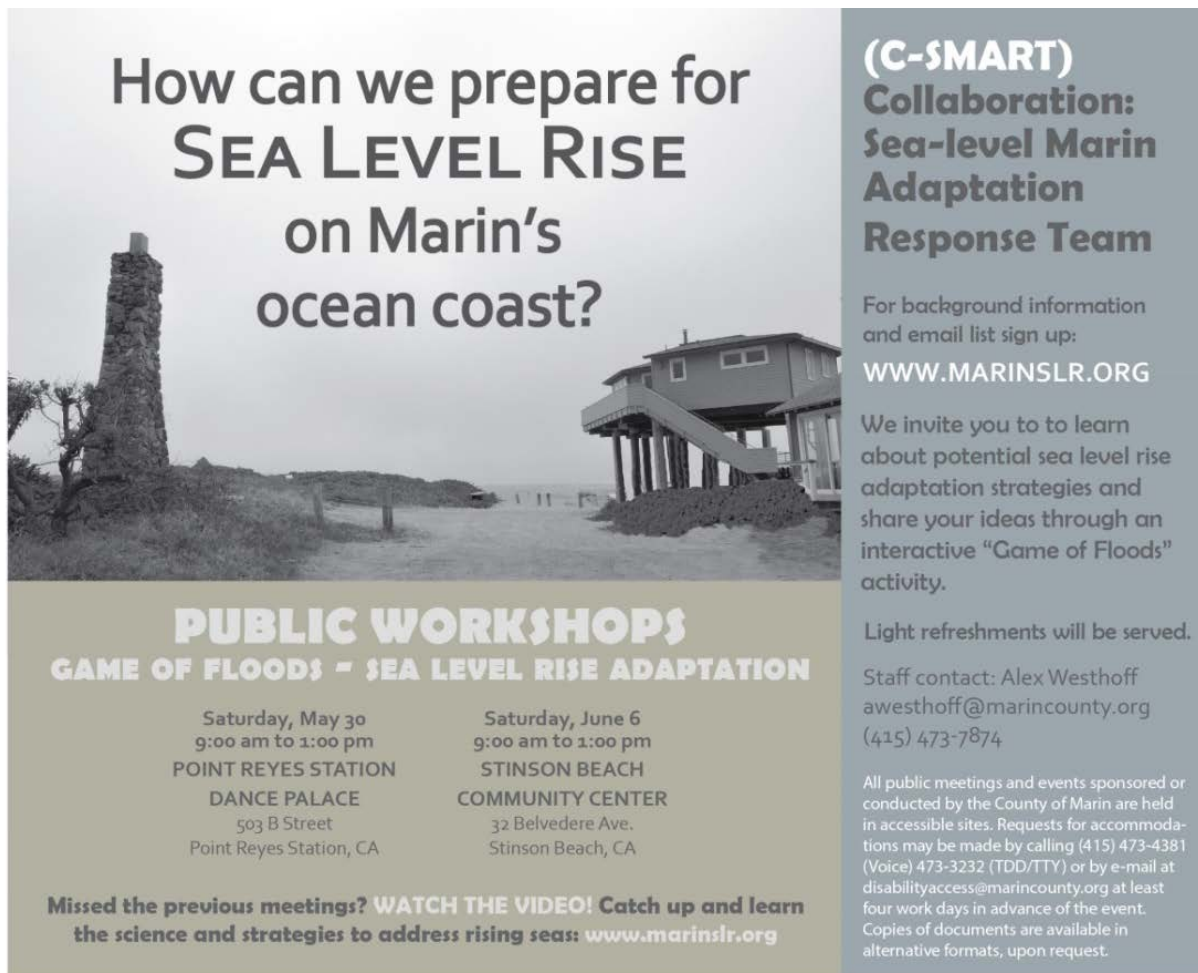


**Marin County Community Development Agency  
Collaboration: Sea-level Marin Adaptation Response Team (C-SMART)  
Spring 2015 Public Workshop Results Summary**

The Marin County Community Development Agency (CDA) hosted community workshops on May 30, 2015 at the Dance Palace in Point Reyes Station and June 6, 2015 at the Stinson Beach Community Center as the third round of public outreach for Collaboration: Sea-level Marin Adaptation Response Team (C-SMART). The County project team provided an update on the progress of C-SMART, and introduced a variety of sea level rise adaptation strategies for consideration (See the [PowerPoint presentation](#)). Workshop participants played the *Game of Floods*, an interactive charrette-style activity designed to stimulate discussion about the tradeoffs involved in adapting to sea level rise. Adaptation strategies are grouped into categories of hard engineering, nature-based solutions, accommodation, and managed retreat. Participants then completed community-specific workbooks to apply what they learned to their communities. Approximately 25 people participated in the Point Reyes Station workshop, and 40 people participated in the Stinson Beach Workshop. This report summarizes the outcomes of the *Game of Floods* activity and comments received through evaluations and workbooks.



**How can we prepare for  
SEA LEVEL RISE  
on Marin's  
ocean coast?**

**(C-SMART)  
Collaboration:  
Sea-level Marin  
Adaptation  
Response Team**

For background information  
and email list sign up:  
[WWW.MARINSLR.ORG](http://WWW.MARINSLR.ORG)

We invite you to to learn  
about potential sea level rise  
adaptation strategies and  
share your ideas through an  
interactive "Game of Floods"  
activity.

Light refreshments will be served.

Staff contact: Alex Westhoff  
[awesthoff@marincounty.org](mailto:awesthoff@marincounty.org)  
(415) 473-7874

All public meetings and events sponsored or  
conducted by the County of Marin are held  
in accessible sites. Requests for accommoda-  
tions may be made by calling (415) 473-4381  
(Voice) 473-3232 (TDD/TTY) or by e-mail at  
[disabilityaccess@marincounty.org](mailto:disabilityaccess@marincounty.org) at least  
four work days in advance of the event.  
Copies of documents are available in  
alternative formats, upon request.

**PUBLIC WORKSHOPS  
GAME OF FLOODS - SEA LEVEL RISE ADAPTATION**

Saturday, May 30 9:00 am to 1:00 pm POINT REYES STATION DANCE PALACE 503 B Street Point Reyes Station, CA	Saturday, June 6 9:00 am to 1:00 pm STINSON BEACH COMMUNITY CENTER 32 Belvedere Ave. Stinson Beach, CA
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**Missed the previous meetings? WATCH THE VIDEO! Catch up and learn  
the science and strategies to address rising seas: [www.marinslr.org](http://www.marinslr.org)**

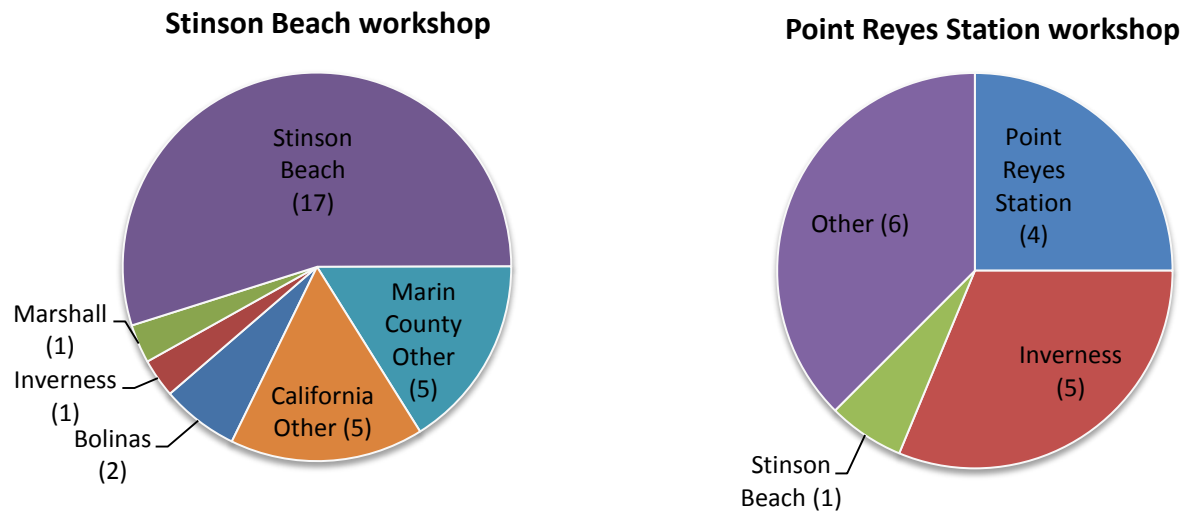
Figure 1. Workshop announcement in Point Reyes Light newspaper

## Workshop Publicity

The public workshops were promoted extensively, including an announcement on the C-SMART website ([www.marinslr.org](http://www.marinslr.org)), distribution via a listserv of 4,000 people, posted fliers on various community bulletin boards, a West Marin County Radio interview with project staff, a press release, and ads placed in the Point Reyes Light. Members of the C-SMART Stakeholder Advisory Committee (SAC) also spread the word through local community networks and organizations.

## Participant Geography

Workshop participants came from various communities throughout Marin County and the Bay Area. Unsurprisingly, the Stinson Beach workshop was well represented by residents of Stinson Beach, while the majority of Point Reyes Station participants came from Point Reyes Station and Inverness.



## Game of Floods Activity Summary

Groups of four to six people played the *Game of Floods*. A trained facilitator read the scenario card describing potential sea level rise impacts with 10 inches of sea level rise (red zone), 10 inches sea level rise + annual storm (orange zone) and 10 inches sea level rise + hundred year storm (yellow zone). The scenarios provided a framework for discussing temporary versus permanent inundation, and phased approaches to adaptation planning. Players rolled a di to determine order of play then each selected an asset to adapt, accommodate, protect, or retreat from sea level rise. Assets include homes, roads, schools, fire stations, hospitals, grocery stores, water supply, wastewater, natural resources, and more.

“I loved the brainstorming and the alignment of common purpose. Strategic planning, in a cooperative manner, works.”

Each player took a few minutes to complete their “Planning Commissioner worksheet” individually to record their proposed strategies. In turn each shared their ideas with the group and placed game pieces depicting the strategies on the board (See Figure 2). Players could also draw other adaptation strategies on blank game pieces.

Groups then discussed the environmental, economic, and social consequences of the adaptation measures and recorded a proposed adaptation plan on the chart paper. Many people found that the collaborative approach of working out any potential conflicts between the proposed adaptation strategies and moving beyond individual assets to thinking about a regional strategy to be an enlightening experience. After about one hour of small group discussion, a spokesperson from each group presented the adaptation plan, rationale behind strategy selection, and total estimated cost of their group’s plan.

“I liked the collaborative approach because others thought of interventions that I had not. I learned a lot from the process. I wish more of the younger residents had been here.”

Collaboration among group members was generally strong, resulting in cohesive, somewhat prioritized adaptation plans that protected a variety of assets on Marin Island. Most groups used a phased approach to elevate or protect homes and critical infrastructure facing immediate threats, then retreat and relocate upland, and implement stricter land use zoning and post-storm prohibitions. Key assets, such as hospitals and schools, were initially protected by levees or elevated then moved in the long-term. Roads were widely agreed to be a critical "lynch pin" asset because disruption would impact other



Figure 2. Example of a completed Game of Floods board with adaptation strategy game pieces

coastal assets. Some groups proposed protecting critically vulnerable and constrained sections of roads with hard infrastructure such as levees and seawalls, and using wetlands and horizontal levees to reduce flood impacts where space allowed.

Nature-based solutions such as wetland and dune restoration were proposed for sheltered areas with enough space to accommodate floodwater and high tides, and in locations where they could serve as a buffer for adjacent development. Innovative solutions such as boat service to move agricultural products to market during road flooding, and desalination plants to provide fresh water were also suggested. Discussion of funding mechanisms included assessment districts, community land trusts to facilitate "elegant retreat", climate change assessment fees, carbon tax funds, and allowance of higher-density development in some areas to generate revenue that could be put toward adaptation strategies. Participants also noted that land use policies should be updated to make it easier for property owners to retreat and relocate, if desired or necessary.

At the workshop in Point Reyes Station, the estimated cost of the proposed adaptation plans ranged from \$65 million to \$134 million, based on estimated per unit costs of \$ - \$\$\$\$ assigned to each game piece unit, and the number of pieces used by each group. In Stinson Beach, adaptation plans ranged from \$60 million to \$307 million. See the [Game of Floods materials](#) for cost estimates. Costs couldn't be

“We need stricter zoning in vulnerable areas. Don't spend money on areas that are doomed in the short-term.”

completely normalized among the strategies due to different units (eg. miles of levee vs. number of structures elevated). However, the inclusion of cost estimates in the activity helped community members consider the economic tradeoffs.



Figure 3. Participants in the May 30, 2015 workshop in Point Reyes Station

## Individual Workbooks

Workshop participants were invited to fill out individual workbooks to share ideas about adaptation in their communities. Some comments were general, and others were geographically specific.

### Bolinas

- Move the school
- Build a big wall around sewer pump station and install solar panels.
- Orderly accommodation: Method to “value” the underlying resource (water meters, roads, etc.) to permit relocation; explore relocation to Big Mesa.
- Improve roads on Big Mesa to accommodate new relocated development.
- Compensation methods need to be equitable.

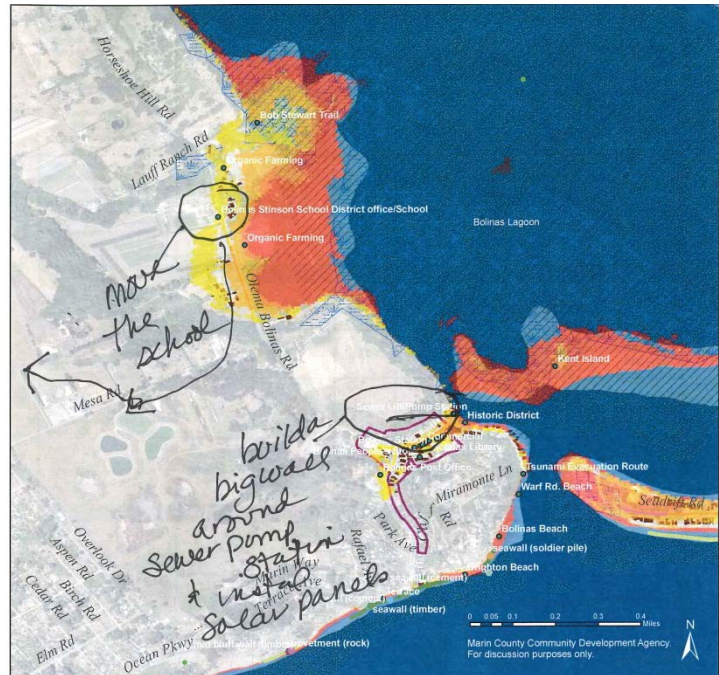


Figure 4. Map from a participant's Bolinas Workbook

### Stinson Beach

- Permanent drainage from NPS parking lot to ocean.
- Construction of berm at north end of NPS parking lot.
- Dredging of Easkoot Creek to control flood damage.
- Retreat from seaside of Seadrift.
- Elevate Highway 1 by Bolinas Lagoon.
- Possibly elevate Highway 1 through Stinson Beach.
- Elevate Calle del Arroyo.
- Elevate or move Calles and Patios?
- Privately financed (Seadrift):
  - Horizontal levees
  - Beach protection and nourishment
  - 5 foot fill, raise every house as necessary
  - Bridge connecting Seadrift road to Hwy 1 over southeast part of Bolinas Lagoon.
  - Septic systems replaced by sewage treatment up on hill that reclaims potable water
- Desalination to protect wells and create barriers for salt water
- Issue is private septic systems and threat of a large commercial development if a sewer system is installed – i.e. very strict zoning.

## Inverness

- Raise low sections of Sir Francis Drake Boulevard.
- Raise buildings near Yacht Club. Raise Tomales Bay Inn and parking lot.
- Raise Inverness Store and Dixon's - Add flood wall, raise road and parking.
- Buy out homes on bay side of Sir Francis Drake Boulevard that are low or raise them.
- Put low levee in front of Inverness Park store and commercial buildings.

## General comments

- Begin with education and cooperation as a community. From there, proceed towards both soft and hard improvements as time and cash flow permits.
- Maintain continuity in transportation while changes are instituted.
- Make essential services (fire, police, transit, schools, community facilities, churches, houses, etc.) permanently protected – raise or move to safer ground.
- Respect private property – it will not change – even underwater.
- Develop changed physical realities to meet future circumstances. Respect that change always happens, and will continue. Nature is an indomitable force. Nature wins – we adapt.
- Water meters are not an asset – water is an asset.
- Several members of the Mainstreet Moms group in Point Reyes suggested retreating from areas affected by sea level rise and moving key infrastructure upland. One adaptation measure suggested was to moor boats offshore when marinas become inundated.

## Workshop Evaluation Surveys

Based on the 18 evaluation surveys received, the majority of people who participated in the workshop felt that it improved their understanding of sea level rise adaptation strategies. Participants were evenly divided in their assessment of their own knowledge of sea level rise before the workshop – half said they knew a lot, and half said they knew a little. Of those who knew a lot, three said the presentation and Game of Floods improved their understanding of sea level rise adaptation strategies “a lot” while four said “somewhat”. Of those who knew “a little”, five said it improved their understanding “a lot”, two “somewhat”, and one “a little”.

## Next Steps

County planners will carry over the ideas participants shared for consideration when drafting the adaptation plan for Marin County and amending the Local Coastal Program.

## Game of Floods: Planning Commissioner Worksheet and Chart Notes Summary May 30, 2015 – Point Reyes Station

Group 1 - Spotted Owls				
2030 & 2050: Near and Medium-term Scenarios			PROS	CONS
Assets	Adaptations	Costs	Social Equity, Environmental, Political, & Economic Impacts	
Homes on spit	Retreat	5 x \$\$\$\$		
	Elevate	5 x \$\$\$	Elevate homes in yellow zone.	
	Rezone	\$	County should rezone land to accommodate residents forced to abandon spit area.	
Sewage system	Move	3 x \$\$\$	Marshall Community Wastewater facility.	
Water system	Offshore structure	2 x \$\$	Water availability is crucial.	
	Beach maintenance	\$\$\$		
School	Levee (near-term)	\$\$\$\$		Prone to failure.
	Retreat (med-term)	\$\$\$\$		
	Wetland	8 x \$\$\$	Environmentally good.	Viable in sheltered areas.
	<b>TOTAL</b>	65 x \$		

Group 2 - Oyster Catchers				
2030 & 2050: Near and Medium-term Scenarios			PROS	CONS
Assets	Adaptations	Costs	Social Equity, Environmental, Political, & Economic Impacts	
Hospital	Elevate (near-term)	\$\$\$	Protect at-risk population. Job creation. Build green.	Cost, environmental impact. Elevate only the critical parts.
	Move (med-term)	\$\$		
Sewage Lift Station	Elevate (near-term)	\$\$\$	Medium flood protection.	May expose foundation to future damage.
	Move (med-term)	\$\$\$	Long term protection against all hazards. Use of updated technology to increase efficiency/ lifecycle of asset.	Initial negative environmental impact, but over time, better than inaction.
Agriculture	Boats to transport products to market	\$\$\$	Maintain viability of agriculture even if access roads are flooded.	Who will pay? Government builds docks?
	Desalinization plants	?	Allow farming to continue with scarce freshwater resources.	Uncertain environmental impacts and feasibility at farming scale.
Road (Drake)	Seawall or flood wall and Pump	8 x \$\$\$	Need to protect only current land. Access to area in key locations.	
	Wetland/shoreline vegetation	3 x \$\$\$	Allow water to move inland and spread out. Diffuse flood water.	Prioritize nature-based strategies where there is room.
Sewage Lift Station	Floodable and "floatable" existing development	6 x \$\$\$\$\$		

	Retreat	4 x \$\$\$\$	Homes purchased and relocated. Form Community Land Trust to voluntarily purchase properties.
	Move	4 x \$\$\$	Collaborative effort between government and homeowners.
	<b>TOTAL</b>	105 x \$	

Group 3 - Harbor Seals				
2030 & 2050: Near and Medium-term Scenarios			PROS	CONS
Assets	Adaptations	Costs	Social Equity, Environmental, Political, & Economic Impacts	
<b>Housing</b>	Offshore structure	\$\$	Protect most at-risk areas.	
	Beach restoration	\$\$\$		
	Traditional levees	\$\$\$\$		
	Horizontal levees	\$\$\$\$		
	Retreat	\$\$\$\$		
	Move	\$\$\$		
	Zoning restrictions	\$		
<b>Septic systems</b>	Convert to public facilities (dense areas)	\$\$\$		
	Zoning restrictions (less dense areas)	\$		
<b>Fire station</b>	Retreat	\$\$\$\$		
	Move	\$\$\$		
<b>Natural resources</b>	Wetlands	\$\$\$	Environmentally better than tidal gate.	
	Beach restoration	\$\$\$		
	Offshore structure	\$\$		
<b>Wells</b>	Retreat	\$\$\$\$		
	Move	\$\$\$		
	<b>TOTAL</b>	134 x \$		

Group 4 - Grey Whales				
2030 & 2050: Near and Medium-term Scenarios			PROS	CONS
Assets	Adaptations	Costs	Social Equity, Environmental, Political, & Economic Impacts	
<b>Roadways</b>	New/elevate road	\$\$\$\$\$	Continues movement of traffic and flow of commerce. High priority.	Residents displaced.
	Post-storm prohibition	\$	Manage the number of people on the roadway. Investigate use of fire roads and private ag road to link areas.	Emergency events.
	Ferry service	?	To distinct areas.	
<b>Historic structures</b>	Elevate buildings	\$\$\$		



<b>Housing</b>	Wetland/shoreline vegetation	2 x \$\$\$	Environmental benefit. Reduce storm surges.	Not good in open wave areas.
	Horizontal levee	4 x \$\$\$\$	Orange/yellow zone housing.	
	Retreat	4 x \$\$\$\$	After SLR and storm surge destroys homes in red zone, retreat.	
	Elevate buildings	4 x \$\$\$		
	Move	4 x \$\$\$		
	Stricter land use zoning	4 x \$		
<b>Agriculture</b>	Retreat	\$\$\$\$	Environmentally superior.	Reduced productivity or change in crop.
	Wetland/shoreline vegetation	\$\$\$	Environmentally superior. Long-term functionality.	Difficult to find usable land.
	Move	\$\$\$\$		
	Stricter land use zoning	\$	Short-term response	Further economic impact on viability of ag. Constitutional uncertainty.
	Horizontal levee	\$\$\$\$	Environmentally superior	Land costs, or loss of usable ag land, or both.
	<b>TOTAL</b>	91 x \$		

<b>General Notes</b>	Too many assets to protect. How to prioritize? Who chooses? Who pays and how?	Public asset costs vs. private asset costs. Use public funds to protect public assets but not private assets.	Difference in assets damaged by flooding vs. assets destroyed.
	Carbon credit program? Assessment district or Community service district? Consider cost of no action.	Climate change assessment fee? Insurance companies?	Overall system collapse with little infrastructure, food scarcity/food riots. Therefore, use every mitigation measure possible. Post-storm prohibitions, stricter land use, etc. Grow our own food. Get out of your car - walk or bike. New monetary/economic system needed.

## Game of Floods: Planning Commissioner Worksheet and Chart Notes Summary June 6, 2015 – Stinson Beach

Group 1 - Bobcats				
2030 & 2050: Near and Medium-term Scenarios			PROS	CONS
Assets	Adaptations	Costs	Social Equity, Environmental, Political, & Economic Impacts	
Road	Reroute	\$\$\$\$	Accessibility remains	Abandon roads
	Revetment	\$\$\$	Relocate road	
	Horizontal levee	\$\$\$\$	Move critical services with road, including utilities.	
Environment	Protect shoreline		Let the flexibility and nature govern including innovation for protecting structures and sewage treatment.	
Firehouse	Beach maintenance	\$\$\$		
	Offshore structure			
	New/elevate road	\$\$\$\$		
Sea lion habitat	Wetland expansion	\$\$\$		
	<b>TOTAL</b>	\$82 mil		

Group 2 - Black Tailed Deer				
2030 & 2050: Near and Medium-term Scenarios			PROS	CONS
Assets	Adaptations	Costs	Social Equity, Environmental, Political, & Economic Impacts	
Agriculture	Retreat and Move	\$\$\$	Move cattle/ag upland. Rebuild in a sustainable way. Revision our community.	Expensive.
Home	Berm	\$\$\$	Could be long-term if out flood drainage (temp?)	
	Creek dredge	\$\$\$		Could concentrate certain areas - behind Parkside.
Parking lot (south)	Horizontal levee	\$\$\$\$	Permanent drainage to ocean	
	Berm	\$\$\$	Will alleviate overall flooding?	Area dredging at high risk behind Parkside and calles.
Development	Cooperation and education	\$	Cooperation between parts of community.	
Homes above eroding cliffs	Protect	\$\$\$\$	Explore: stabilization options, obtain cost estimates, temp. delaying tactics like seawall.	Explore value of real estate preserved.
	Move	\$\$\$	Identify relocation for retreat from the cliffs. Examine zoning	
School site	Levee	\$\$\$\$		negative environmental impact, short to mid term
	Seawall	\$\$\$		negative environmental impact, short to mid term
	Horizontal levee	\$\$\$\$	Low environmental impact	
Homes	Elevate houses	\$\$\$		

	Dune cultivation	\$\$\$	
	Road elevation	\$\$\$\$	
	<b>TOTAL</b>	\$307mil	

Group 3 – Gray Whales				
2030 & 2050: Near and Medium-term Scenarios			PROS	CONS
Assets	Adaptations	Costs	Social Equity, Environmental, Political, & Economic Impacts	
Downtown/village	Retreat & Move	4	Relocate road to yellow - not raised.	
	Retreat & Move	6	Relocate buildings and other assets to ag land.	Use some ag land. Need to condemn.
Residential near harbor	Traditional levee	6	3 miles	Affect marine mammals? Lose beach?
	Relocation	1	1 mile	
Road	Move	3	Relocate road accessing residential area to fjord to yellow zone. 3 miles.	
Homes by fjord	Retreat	5	Buy out homes.	
Homes on spit	Seawall	18	6 miles. Spit residents pay by assessment.	
	Horizontal levee	4	1 mile across mouth.	
	Wells - 3 Desal.	1.5		
	Wastewater collection	3		
Homes	Move	6	Relocate homes to ag.	
Sewer	Move	1	Sewer to existing ponds.	
Eroding cliffs	Retreat	0	Let homes fall.	
	<b>TOTAL</b>	\$59.5		

Group 4				
2030 & 2050: Near and Medium-term Scenarios			PROS	CONS
Assets	Adaptations	Costs	Social Equity, Environmental, Political, & Economic Impacts	
Fire station	Elevate	\$\$\$	Keeps proximity, access	Expensive
	Move	\$\$\$	Keeps proximity, access	Expensive
	Seawall	\$\$\$	Allows existing to remain	Environmental impacts
Water system	Cast iron pipelines	\$\$	Some water lines will be underground	
	Move	\$	Move groundwater wells further up in elevation to avoid sea water intrusion and corrosion. Create new wells.	
Septic	Elevate	\$\$	Pump up from septic tank to leach field? Build a collection system?	
	<b>TOTAL</b>	\$108		