Kachemak Bay and Kenai Peninsula

CLIMATE RESILIENCE WORKSHOP

SUCCESSFUL ADAPTATION PART II:
STRATEGIES, PATHWAYS, AND EVALUATION

April 20-21st, 2017

Alaska Islands and Ocean Visitor Center | Homer, Alaska

Workshop Summary Report

Kachemak Bay National Estuarine Research Reserve
Alaska Center for Conservation Science
University of Alaska Anchorage

National Estuarine Research Reserve System Science Collaborative

Susanne Moser Research & Consulting

Tijuana River National Estuarine Research Reserve

Workshop Partners

Syverine Abrahamson, Kachemak Bay National Estuarine Research Reserve

Danielle Boudreau, Tijuana River National Estuarine Research Reserve

Susanne Moser, Susanne Moser Research and Consulting

James Arnott, NERR Science Collaborative

Additional assistance provided by:

Jessica Shepherd and staff, Kachemak Bay National Estuarine Research Reserve

Gwen Shaughnessy, NOAA Office for Coastal Management

Bree Turner, NOAA Office for Coastal Management

For more information go to:

Kachemak Bay National Estuarine Research Reserve
http://accs.uaa.alaska.edu/kbnerr/climate-resilience/

Tijuana River National Estuarine Research Reserve
http://trnerr.org/climate-scenario-planning-alaska/

NERR Science Collaborative Successful Adaptation Indicators and Metrics Project
http://graham.umich.edu/water/nerrs/resources/climate

Table of Contents

Participants

NAME		ORGANIZATION
Donna	Aderhold	Homer City Council
Steve	Baird	KBNERR
Robert	Archibald	Friends of Kachemak Bay
Mandy	Bernard	Mountains to Sea Project
Dan	Conetta	Kenai Peninsula Borough
Laurie	Daniel	KBNERR
Angela	Doroff	KBNERR
Willy	Dunne	Kenai Peninsula Borough
Julie	Engebretsen	City of Homer
Chris	Guo	KBNERR
Roberta	Highland	Kachemak Bay Conservation Society
Kris	Holderied	NOAA Kasitsna Bay Lab
George	Matz	KBNERR Community Council
Sue	Mauger	Cook Inletkeeper
Erin	McKittrick	Ground Truth Trekking
John	Morton	Kenai National Wildlife Refuge
Dana	Nelson	KBNERR
Karyn	Noyes	Kenai Peninsula Borough
Alice	Rademacher	KBNERR
Rosie	Robinson	KBNERR
Hal	Shepherd	Water Policy Consulting
Franco	Venuti	Homer Planning Commission
Kyra	Wagner	Homer Soil & Water
Coowe	Walker	KBNERR
Bruce	Wall	Kenai Peninsula Borough

Kachemak Bay National Estuarine Research Reserve
Alaska Center for Conservation Science
University of Alaska Anchorage

Susanne Moser Research & Consulting

National Estuarine Research Reserve System Science Collaborative

Tijuana River National Estuarine Research Reserve

SUCCESSFUL ADAPTATION PART II: STRATEGIES, PATHWAYS, AND EVALUATION

April 20th, 8:30 am - 5:00 pm
April 21st, 8:30 am - 12:30 pm

Alaska Islands and Ocean Visitor Center
95 Sterling Hwy, Homer AK

Workshop Goals

Building on participants' experience and expertise, as well as the workshop in fall 2016, and the Kenai Lands Forum this spring, we will take the next steps in thinking about planning processes and community efforts to prepare for, adapt to, and work together towards a climate-resilient future. In this workshop we will:

- Link the search for solutions to current problems to planning processes and partnerships
- Evaluate short and long term adaptation in light of our vision and future scenarios
- Develop indicators and metrics of successful adaptation
- Identify ways to proactively build capacity to respond to change

Agenda

DAY 1: April 20, 2017

8:30 am	**Registration** Light breakfast available
9:00 am	**Welcome** Introductions, purpose and arc of workshop Revisiting the community vision and participant achievements
10:00am	**Where does the boat leak?** Presentations from local issue leads Applying resilience building/climate adaptation to current issues and problem-solving through planning processes and partnerships
10:30am-12:00pm	**How could the leak be fixed?** Breakout Session- Coffee/tea available Brainstorming additional strategies to address issues related to: • Infrastructure protection

	• Food security • Habitat conservation • Water quality
12:00-1:00pm	Lunch provided *Gallery walk of Alaskans Know Climate Change Art Show*
1:00-2:45pm	**Testing our strategies against the future** Group Activity Adaptive decision making in the face of uncertainty using climate scenarios
2:45-3:15pm	Coffee/tea break
3:15-4:45pm	**Transparent decision-making** Identifying and applying appropriate decision criteria to select best possible adaptation strategies
4:45-5:00pm	**Wrap up of Day 1 & Outlook to Day 2**

DAY 2: April 21, 2017

8:30am	**Welcome, Review of Day 1 and Overview of Day 2**
9:00-10:30am	**Indicators and Metrics** Identifying and tracking indicators of adaptation progress and effectiveness
10:30-11:00am	Networking Break
11:00-12:00pm	**Building capacity** Making connections with resources and people to implement desired actions and learn as we go
12-12:30pm	**Closing Reflections** Next steps and commitments of participants to advance climate resilience
12:30- 1:30pm	**Adjourn** Networking lunch available

Workshop Overview

Purpose

Climate change impacts in Alaska are much more pronounced than in other regions of the United States. Outside of the high-arctic, the impacts of recent climate change have been better documented on the Kenai Peninsula than elsewhere in Alaska; however, none of these efforts have resulted in tangible recommendations or a long-term strategy for adaptation when faced with uncertainty about forecasted futures as a result of rapid climate change. To address local issues, this project aims to enhance regional capacity of coastal communities on the Kenai Peninsula to adapt and prepare for a changing climate.

Goals

Building on workshop participants' experience and expertise, as well as on the two previous workshops[1], participants took the next steps in developing efforts to prepare for, adapt to, and work together towards a climate-resilient future. In this workshop, participants:

- Linked the search for solutions to current problems and planning processes and partnerships
- Evaluated short- and long-term adaptation in light of our vision and future scenarios
- Developed indicators and metrics of successful adaptation
- Identified ways to proactively build capacity to respond to change

Throughout the workshop, participants worked collaboratively to strategize for current climate related problems, and tested the strategies against plausible climate futures. We then identified decision making criteria, and brainstormed indicators and metrics to evaluate successful strategies.

Workshop Design & Audience

These goals were accomplished by leveraging and integrating both the existing partnerships within the National Estuarine Research Reserve System (NERRS), and local partnerships and efforts on the Kenai Peninsula, establishing a process and developing products that will increase understanding of regional and community-level vulnerabilities and opportunities. Three training partners from the NERR System collaborated on this workshop:

- Kachemak Bay National Estuarine Research Reserve has established itself as a nexus for partnerships through the Coastal Training Program (CTP), and a regional leader in climate science, with a place-based research and monitoring program.
- Tijuana River NERR brings extensive experience in climate scenario development and adaptation planning through the Climate Understanding and Resilience in the River Valley (CURRV) project. Their expertise in community-based collaborative planning as well as lessons-learned from their efforts to strengthen the efficacy of local climate planning was applied.
- The NERRS Science Collaborative Successful Adaptation Indicators and Metrics (SAIM) project supports participating reserves and nearby coastal communities in developing indicators and metrics of successful adaptation. Their expertise in tracking adaptation success as well as related work on indicators of vulnerability, sustainability, ecological health, and other areas informs the process, and contributes to meaningful and tangible adaptation strategies and pathways.

This workshop's target audience included: local and regional government staff, tribal and community leaders, staff of environmental organizations, and land and resource managers.

[1] To access materials and summaries from the previous workshops in this series visit: http://accs.uaa.alaska.edu/kbnerr/climate-resilience/

Summary of Workshop Proceedings

DAY 1: APRIL 20, 2017

WELCOME AND INTRODUCTIONS

Syverine Abrahamson, KBNERR Coastal Training Program, outlined the workshop background, intent and goals. She described how the collaborative project was built and introduced partners, explaining that this was the culmination of a workshop series. Participants introduced themselves, coming from a broad range of decision-makers and stakeholders on the Kenai Peninsula, sometimes representing multiple organizations or entities. Many attendees expressed that the group benefited from participation of planning departments and elected officials from the municipal, borough and state level.

WHERE DOES THE BOAT LEAK?

Presentations: Where does the boat leak?

In the opening session of the climate workshop local experts gave ~5-10 minute recaps of issue areas to orient everyone to the work we have done so far. We set the stage with a description of the state of local issues from a point-person's perspective in 4 areas. Syverine Abrahamson introduced local topical experts who gave a brief introductory description of the major current and historical issues problems. The questions they addressed were:

1. What are the current issues?
2. How can we build capacity to meet challenges?
3. What will we be faced with in the future?

- ***Water management challenges*** (Julie Engebretsen- City of Homer)

Issues:

- Drinking water (fairly robust system in place)
- Waste water (8ft above SL- SLR & storm surges may be long-term problem)
- Stormwater runoff pollution

Capacity:

- Where our boat is shaky is stormwater, replacing one storm drain is a $400,000 project. Having funding to solve problems in future is a long-term issue.

Future:

- Lack of water may potentially be more shocking for people (harder for people to deal with or accept).

- ***Food security issues*** (Kyra Wagner- Homer Soil and Water Conservation District)

Issues:

- Import 95%- 98% of our food

- A lot of wild harvest
- Managed food systems on the rise- southern peninsula becoming popular
- Land owner issues with managed food systems
- Picking lands for managed food production would help to ensure that water issues and land management issues are taken into account

Capacity:

- Need more food production
- Challenges- how do you get them to do it wisely
- Production farmers- produce less than an acre, the other 50% are less than 5 acres- don't have large scale production but do need more producers

Future:

- Issues will arise around land management, regulations or lack thereof, people taking action and no connection to big picture, and climate refugees moving here.
- Changing environmental conditions include OA, warmer streams affecting salmon, and drier landscapes affecting fruit production.

➢ ***Infrastructure challenges*** (Steve Baird- KBNERR)

Issues:

- Riverine erosion
- Roads- A lot of roads built in the 40s without an understanding of how quickly they erode
- Airport- changing weather patterns might lead to having to build the cross runway
- Marine highway/ transportation – including personal local transportation
- Harbor- constant effort to dredge the harbor
- Electric grid- transmission lines at risk
- Oil/ gas- not a lot of oil, new gas lines that run all around the peninsula at risk
- Private business- erosion took out local business stairwell

Capacity:

- Improve our understanding of the physical processes and how it impacts the infrastructure
- Creating dialogue- getting people to talk across jurisdictions/disciplines

Future:

- Water management
- Increasing water supply may increase capacity for small scale hydro
- Extreme flooding events- more rain events, more flooding- take out critical infrastructure
- Coastal erosion - if SLR ever does become an issue erosion may increase
- Opportunity- job opportunities in rebuilding, living shorelines concept may help mitigate some coastal erosion (already used on rivers somewhat)
- Methane extraction (new industry) may have high demand for water

➢ ***Land resource management issues*** (Sue Mauger- Cook Inletkeeper)

Issues:

- Homer is not a salmon landscape- not salmon streams running through the city but have Salmon in our freezers and part of our diet
- Some major risks have to do with more people needing food, wanting to recreate- typical salmon landscape faced with and adding in climate change it's a huge concern
- Vibrant tourist area- fish supporting bears and eagles- keep our terrestrial environment healthy…all of this is very connected, not just fish but whole watershed

Capacity:

- Trying to understand how water and land interconnect and now what's underneath us (groundwater)
- Move into the social realm
- Way people think is not necessarily different in terms of climate change but because climate change has become political/ conflict based makes land management conversations very charged
- Hold hope that we have some things in place that provide opportunities
    - Borough Coastal Management Plan, timing is good with new info and energy in this room
    - Existing set back to protect river habitat- needs to be renewed every two years
    - Fish habitat partnerships
    - Mountain to sea collaboration
    - Land management forum- would like to follow-up in a year to see turn over and what agencies can still be engaged

Future:

- Need to know more about groundwater- where in landscape is our groundwater being recharged?
- No other salmon landscape has been successful in rehabilitation (none on Atlantic coast or Europe, less and less on the lower 48) need to be way more creative and bold

HOW COULD THE LEAK BE FIXED?

Breakout Group Activity: How could the leak be fixed?
After the topical area overviews, participants joined 1 of 4 breakout groups to brainstorm alternative strategies to address current problems. Each group focused on one of the key topical areas introduced in the first section: *infrastructure, water resources, habitat conservation, food security.* Using the lists of adaptation strategies they had developed in previous workshops (Appendix A), as well as planning processes (Appendix B) and partnerships (Appendix C) tables from the Kenai Lands Forum, they refined activities and outputs, partnerships and frameworks they would use to create a strategic pathway towards solving the issues. Groups each created a strategies table (Appendix D) documenting the pieces needed to address current and future issues.

Long-term Outcome *Condition* What do you ultimately hope to achieve?	**Mid-term Outcome** *Action* What do people do?	**Short-term Outcome** *Learning* What do people understand?	**Strategy** *Activities* What you will do?	**Strategy** *Outputs* What will you produce?	**Partnerships** What organizations or individuals need to be involved?	**Frameworks & Timing** What existing plans & processes? What stage are they in?

Report Out:
Once the groups completed their plans, they shared out the key ideas and strategies generated in each group (ideas listed below). Throughout the process, participants reflected on the process and its usefulness for other issues they have to deal with, and made connections across issues/sectors to avoid maladaptation and find positive synergies.

Habitat conservation

Goal: Sustainable salmon habitat

- Protect riparian- broaden beyond riparian zone
- Educating people on value of having salmon
- Conservation tax breaks- how to incentive people caring
- Having workshops
- Having a working group
- Funds that you can raise in different ways
- Partner with City and Borough
- Comprehensive plan currently being reworked

Infrastructure

Goal: Long-term resilient transportation infrastructure

- Focusing on the one road in and out of homer
- Develop Additional Marine transportation strategies
- Brainstorming if rail transportation is a possibility
- Roads susceptibility to other hazards
- Strategies- what's already being done on marine side (recent feasibility study, changes in dock in Homer)
- Getting the Department of Transportation involved

Food Systems

Goal: Different types of food system issues- sustainable agriculture, mariculture, wild harvest

- Managing invasives
- Strategies- long-term monitoring, looking at the water temperatures
- Species selection
- Business skill building

Water management

Goal: Clean drinking water for all users

- Understand how water and septic are connected
- Understand people's practices on private property
- Maintain reservoir
- Develop conceptual models of water cycle that include pollutant sources
- Partner with DEC, Cook Inletkeeper, Trusts, Municipalities

LUNCH ART GALLERY WALK

During lunch, participants were offered the opportunity to view the art and science collaborative art show in the adjoining gallery, and vote on their favorite piece.
Guiding questions for gallery walk:

- What stands out about what kind of future we want?
- What resonates with you?
- What is important to you? What seems to be important to others?
- Are this morning's strategies sufficient to address issues?

GALLERY WALK REFLECTIONS

Participants reported an emotional gap between visions and actions. Many of the pieces reflected loss and grief, and one piece was about positive solutions. They reiterated the need to get real about solutions and take action on the pieces they could to avoid getting overwhelmed.

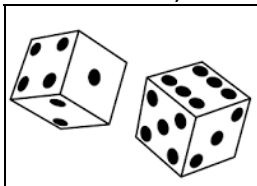
TESTING STRATEGIES AGAINST THE FUTURE

Presentation: Climate Scenarios to test strategies

To test participant generated strategies in the face of uncertainty using climate scenarios, Dani Boudreau presented instructions for a Game of Futures designed to (1) identify which actions are climate sensitive, and which are robust under different climate scenarios; (2) identify ways to make climate-sensitive options more robust; and (3) to utilize the scenario narratives developed in previous workshop to better understand the process of linking scenarios to management decisions.

Breakout Group Activity: Game of Futures

Participants formed groups that represented diverse community interests made up of at least one person from a different fictional agency (e.g., one individual from the stormwater agency, one individual from infrastructure agency…). Individuals introduced themselves to the new group, outlining what agency they represent, and the adaptation strategy they have chosen to implement.
While people played a dice and worksheet game, that pushed them into different future scenarios, they documented ideas and changes they would make to their strategy. It was important to identify low-regret strategies, and new and innovative strategies building on morning discussions (Appendix E for full game instructions).

	**Current State Maintained**	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**
Total	5 - 9	10 - 14	15 - 19	20 - 24	25 - 30

Group Discussion: Scenarios

Groups reported out on who the individual and group "winners" were. The discussion centered on why those individuals/ groups were successful. Questions below prompted conversation:

- What strategies seemed to be the most resilient?
- Community vs. individual (agency) successes?

- How many rounds did your group complete? Why fast or slow?
- What did you struggle with throughout the game?
- Was there one scenario that seemed to be particularly difficult for your agency or community?

Participants identified that capacity needed to implement the strategies may differ depending on which future scenario arose. Flexibility of strategies helps, especially considering long term gradual change or abrupt event driven changes. A participant noted that we may need to shift to currently culturally unacceptable options, and compromise other decision-making criteria we use to choose strategies.

TRANSPARENT DECISION-MAKING

Whole group exercise: List of Decision-Making Criteria

Susi Moser presented on the ideas of establishing decision making criteria, weighing the criteria and evaluating alternatives and tradeoffs. Participants were given a list of criteria to start with and visited each topical station to review the range of possible strategies and discuss with others whether this list of criteria was complete, needs modification or could be reduced to remove irrelevant criteria. Additional criteria that were less tangible were identified, including quality of life, survival and luxury. Categories of criteria were binned in relation to:

- Economic
- Risk
- Response
- Benefit
- Trade-off

Breakout Group: Test identified action options against criteria

James Arnott directed participants to consider strategies identified for each of the 4 focal topics in relation to the criteria discussed and vision elements. The criteria that are the most important are the ones that can help to quickly include or eliminate strategies from consideration, enabling decision-making shortcuts. Assuming that a set of strategies meet or exceed fundamental standards, secondary criteria should also be identified that support further consideration of relevant factors; assisting with tough choices and improving decision quality. Participants returned to breakout groups to test these criteria on several of the strategies identified for their sectors.

Report out: Participants identified ways to improve the decision-making process, finding shortcuts, and avoiding impasses by focusing on the most important criteria, aided by consideration of secondary criteria after some strategies are eliminated.

Group	**Primary Criteria** (most important)	**Secondary Criteria** (additional consideration)	**Thresholds** (minimum standards, breaking points)	**Notes** (insights, challenges, future needs?)
Water	• Necessity (regulatory) • Social Acceptability • Ease of implementation	• Cost effectiveness • Co-benefits	• Compliance • Health issues • Demand	• Grant availability
Habitat	• Necessity • Timing • Reversibility	• Modification • Flexibility • Co-benefits	• Expiration	• Do we lose opportunity to do it later if we don't do it now?
Food	• Equitable Access • Financial Sustainability • Local impact	• Culturally appropriate • Maladaptation • Self-reliance • High Quality	• Resources to implement	• Need for closed loop food systems
Infrastructure	• Cost • Ecosystem Services maintained	• High Priority Areas	• Safety Issues • Culture shifts	• Multi-functionality • No net loss for fish habitat

DAY 2: April 21, 2017

REFLECTIONS

Welcome and Reflections on Progress

Participants reported on steps made, successes and opportunities they have followed up on from their commitments at the last workshop. Tangible progress included:

- Art and Science Collaborative Project to reach broader community
- Kenai Lands Forum meeting for planning and partnerships
- Comprehensive Plan update participation at the Borough and City level
- Developing research proposals to better understand groundwater movement

INDICATORS AND METRICS

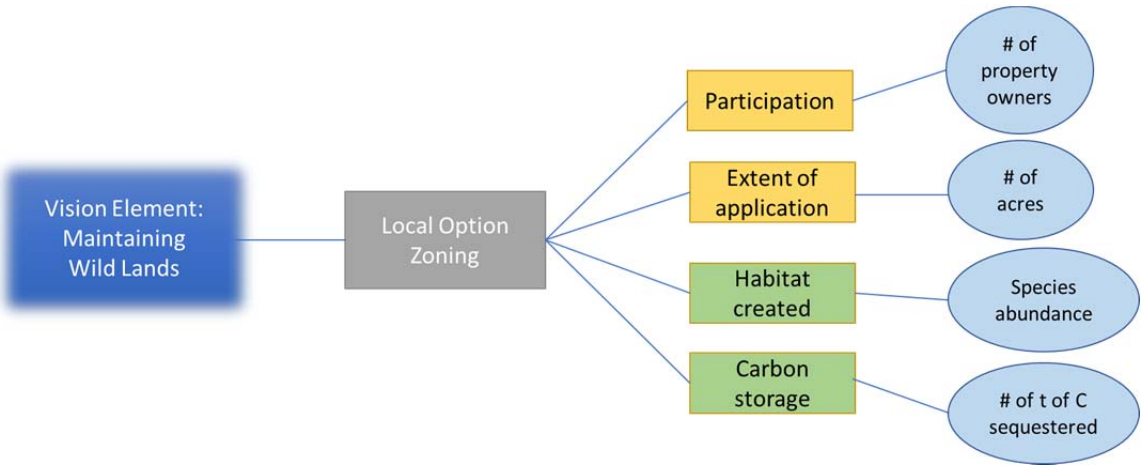
Presentation: Why Think About Success?

Susi Moser outlined the goal of understanding how actions add up to achievement by connecting the vision or outcome we desire to strategies, indicators and metrics. She identified reasons to think about success in the context of how indicators and metrics can be incorporated into decision-making and characteristics of good indicators. Indicators and metrics can be helpful in decision-making through the following ways:

1. Communication and public ngagement
2. Deliberate planning and decision-making
3. Justification of adaptation expenditures
4. Accountability/good governance
5. Support for learning and adaptive management

James Arnott walked through an example from the Habitat group with a Local Option Zoning Strategy from standpoint of:

- What would indicate to you that you have succeeded? **(Outcome indicators)**
- What is needed to track success along the way? **(Progress indicators)**
- How could either of these be consistently measured? **(Metrics)**



Breakout Group I: Identifying Indicators and Metrics

Participants considered vision elements and strategies discussed in issue-groups yesterday and identified indicators of adaptation progress and effectiveness, and determined ways to track them. Participants were reminded to:

- Remember the vision: what would *indicate* that you are making progress toward that vision?
    - Develop a small set of indicators that would indicate success
- Consider the kinds of intermediate targets that would be useful in evaluating along the pathway. Actions completed (Y/N)
    - Decisions made
    - Processes initiated, and run efficiently and inclusively
    - Capacities developed or barriers removed
- For any that you are able to, please indicate how they could be measured (e.g. what units, where would data be collected, and how)

Strategy	Outcome Indicators (Metrics)	Progress Indicators (Metrics)
Resilient Infrastructure Form group Kenai Peninsula Area Transportation Solutions KPATS	• Reliable regional transportation • Infrastructure upgrades	• Frequency of meetings • Inclusive planning/transparent/public input • State DOT engagement
Food Seed bank	• Library formed • Cultural connections • Seed diversity • Supportive legislation • Impact investment	• Number of patrons • Eco-regional map completed (knowledge of adapted-ness) • Leveraging what the wild group is doing • Seed library (eg. deposits) • Acres of land used in production of food
Water Conceptual model of groundwater recharge + outreach	Measurement of understanding: • # of hits on outreach materials • # of references in permitting • diversity of agencies • # of times groundwater issues impact home buying	• Increased understanding and application of permitting • Industry understand groundwater resources • Realtors understand impacts of development on groundwater
Habitat Create tools for managing resilient groundwater	• Tools used • Increased understanding (see metrics from water group)	• Engagement, participation (engaged early, diversity, peer to peer sharing)

Breakout Group II: Existing Indicators and Metrics

- What Indicators and or Metrics are already being tracked?
- What capacities are needed to begin tracking new I&Ms?
- What are some entry points or next steps to get started?

Strategy	Existing I&M	New Capacity Needed	Uses for I&M	Next Steps?
Resilient Infrastructure Form group KPATS	• Stormwater pollution prevention plans (SWPPPs) • Kenai River Center permitting and anadromous streams • Transportation plans	• Inclusive planning process • Number of participants and parties included	• Communication (elevator pitch) • Transportation plan effectiveness • Clarifying strategies	• Connect with DOT, KPB, AK Shield
Food Seed bank	• # of high tunnels • Already have "ecoregion" mapping for clam habitat • Homer sustainability maps	• Technical staff to make maps • Subsurface recharge maps- leverage State of Alaska Salmon and People Grant • Incentive to farmers to preserve prime growing habitat • Understanding who is/ what they are growing	• Great early support for metrics (important for grant vision) • Communication - to encourage engagement and enthusiasm	• Form working group to connect resources • Application for a grant for producers
Water Conceptual model of groundwater recharge + outreach	• Well test results (homeowner and industry)	• Clearinghouse for resources and data related to groundwater • Assess effectiveness of current planning process • Availability of data	• Incorporate in planning • Communication • Currency for collaboration	• Engage in Critical Habitat Area Plan renewal
Habitat Create tools for managing resilient groundwater	• Chinook returns • Temp • Track application and permit decision • Tax credits • CTP monitoring	• Groundwater info during permit process (institutional) • Coordination (human) • Student travel (finance) • Communicating groundwater flow process (technical)	• Communication • Grant writing • Creating baseline	• Engage in Groundwater Resilience Proposal

BUILDING CAPACITY

Full group activity: Reciprocity circle

Susi Moser explained the mechanics of a reciprocity circle where participants write down specific requests or needs for help on sticky notes to get started working on implementing identified strategies. Participants identified 3-5 needs and posted them on the walls. In a second round participants evaluated the needs on the walls and offered help, suggestions, ideas, resources with their names on sticky notes so people can follow-up later on. Requesters of resources picked up their responses.

Breakout Group Discussion: Resources, Capacity and Action

In original breakout groups participants shared the resources they acquired in the reciprocity circle in the context of their issue area and discussed:

- Suggestions and help received
- Existing opportunities and partnerships to implement strategies
- How to fill remaining capacity needs
- Identify immediate next steps and who will take lead on each

Next Steps: Each group shared out on their action items or tasks moving forward

Resilient Infrastructure

- Identify list of people to join KPATS
- Elevator pitch to engage people to join KPATs

Food:

- Artwork around seedbanks
- Assist with education
- Modify seeds of spring lesson plans, writing an article for homer garden club on seed growing
- Getting expertise on seed saving to give training, write newspaper article
- Set up a framework for coordination and communication, catalog
- Outreach about seed bank at Homer Farmers Market, do collaborative Artists in the schools program

Water

- Identify form and function of Watershed Collaborative
- Organize trainings from local expertise to inform planning processes
- Schedule presentation to Planning commission on water quality in KBay to connect research and regulations
- Invite Kenai Change members to planning commission meetings to hold borough accountable to Comp Plan
- Work with planners to transfer info to Port and Harbor, City, ADFG Critical habitat are/ State Park
- Continue to support reserve, bring in resources to offer trainings

Habitat

- Collaboratively develop proposal to create tools for managing resilient groundwater

CLOSING REFLECTIONS

Participants shared their noteworthy takeaways form the workshop. Common themes were:

People: Value of a diverse group of collaborators to cross-pollinate ideas, build relationships, and develop connections for follow up on tasks.

Process: Whole composite matters, there was a lot of value to going through the process with each piece building on the next to get to tangible actions and strategies. Facilitation team was successful in drawing out participant's thinking, and distilling and refining the core ideas. Having time to digest all the materials in a 3-workshop series made all the difference. Time, investment and reinforcements were marshalled.

Outputs: Specific actions and commitments identified, as well as people developing confidence to be a champion for a cause or issue for community benefit.

Relevance: The issues can go beyond the lens on climate change, demonstrating there is a need for these strategies regardless if people want to focus on climate change or not.

APPENDIX A: CLIMATE ADAPTATION MEASURES FROM FALL 2016 SCENARIO PLANNING WORKSHOP

Future 1 Strategies Newspaper Headlines: *-Mud slide buries Two Sisters Bakery* *-Slash and burn vs. fillet and release conflict between agriculture and fisheries* *-Xtra Tuff business booms*	• Nutrient poor soils require alternative agriculture methods including permaculture and plasticulture, slash and burn • Local foods rely on fish seaweeds and mushrooms • More indoor recreation, concerns of mental health with all the rain • Enhance water export business but co-op to protect public water resource and policies • Fishy peat demand shift to fish waste nutrients and maggot farming • More local energy development including wood biomass heat and microturbine hydroelectric • Living shoreline practices to stabilize coastal erosion due to saturated soils • Use green infrastructure and rain gardens to manage downslope discharge • Importing sand to nourish the beaches
Future 2 Strategies Newspaper Headlines *-Future for salmon uncertain* *-Highway blows out again* *-Downstream neighbor plugs culvert*	• Stabilize spit with increased dredging • Higher drive to use emergency mitigation methods for scour and erosion • Educate people on the consequences of their actions, what they can and can't control • Increase shared knowledge between scientists, contractors, homeowners, and managers • Educate people about functions and values of wetlands for preservation • Educate people about where clean water comes from • Emphasize property rights and cumulative impacts of upstream neighbors • Increase industry that is water intensive look into selling/exporting water
Future 3 Strategies Newspaper Headlines *-Sucking Us Dry: lacking groundwater recharge blamed for low salmon return, for dry wells and for economic decline*	• Set aside agricultural lands • Shift from natural food sources to managed food sources • Hatcheries seem more feasible politically and in terms of salmon feed • Rain gardens • Groundwater intervention would help us make decisions - increase importance to protect those areas where there is recharge happening • Desalination plants • Reclaiming riparian zones and buffer zones • Water conservation • Retention ponds instead of wells and cisterns • Pastoral economy takes advantage of grasslands with barley goats, dairy bison and honey
Future 4 Strategies Newspaper Headlines *-Community stability? Change is the new norm* *-Flash floods symptom of larger trend* *-Groundwater loss puts new pressure on reservoir*	• Shift from fisheries to agrarian • More dams and reservoirs • Drier landscape - water thirsty industry could do well here • Recharge groundwater with smaller rain gardens • Changing landscape from individualistic to more communal shared resources • Communities protect assets from flash floods (roads, structures, streams, and agricultural lands)

APPENDIX B: KENAI LANDS FORUM PLANNING PROCESSES TABLE

Organization	Planning Process	Information	Challenge	Opportunity	Climate Related Areas of Concern
Kenai Peninsula Borough	Comprehensive Plan	Shelly Wade shelly@agnewbeck.com Bruce Wall bwall@kpb.us http://www.kpb.us/images/KPB/PLN/PlansReports/2005Plan/ 2005PCmain.pdf	Public vs Private	Strengthen and diversify economy Leverage natural landscape and people	Transportation, Environmental Quality, Economy
Kenai Peninsula Borough	Land Management Division	Marcus Mueller MMueller@kpb.us http://www.kpb.us/landmgt/about-landmgt	Designing classification systems that work for a variety of scales and are easily accessible.	Joint planning units and more partnership based management Increase local planning and support	Forests, Recreation areas, Waterways, Soils, Wildlife
Kenai Peninsula Borough	Coastal Management Plan	Karen Noyes knoyes@kpb.us 907-714-2468 http://www.kenairivercenter.org http://www.kenairivercenter.org/rivercenter/agencies/kpb-coastal-programs	Alaska Coastal Management Program expired in 2011 Borough plan relies on state standards that are no longer in effect.	New State administration may be open to revisiting Alaska's Coastal Management Plan	Coastal ecosystems
USFS – Chugach National Forest	Forest Plan Revision	David Fitz-Enz dfitzenz@fs.fed.us Denise Downie dedownie@fs.fed.us https://www.fs.usda.gov/detail/chugach/=stelprd5408185 https://www.fs.usda.gov/detail/chugach/	Transboundary issues Cooperation with landowners	Cooperative efforts, shared spatial data and modeling	Fire, Invasives, Scenario informed climate adaptation, Wildlife
National Park Service U.S. Department of the Interior	Kenai Fjords National Park Foundation Document	Sharon Kim Sharon_kim@nps.gov 907-422-0546 Eric Veach Eric_veach@nps.gov 907-422-0500	Timeline to implement General Management Plans	More partnership and interagency cooperation	

APPENDIX B: KENAI LANDS FORUM PLANNING PROCESSES TABLE

Alaska State Parks	Kachemak Bay State Park Management Plan	Jason Okuly Jason.okuly@alaska.gov 907-226-4688 http://dnr.alaska.gov/parks/ http://dnr.alaska.gov/parks/plans/kbay/kbayplan.htm	Access, water Rights, Moorage, docks, trail maintenance	Park values stay properly maintained and protected Activities must comply with Alaska Coastal Management Plan	Travel, Tourism, Transportation, Water quality, Recreation
Chugach Regional Resources Commission	Climate Change Adaptation Project	Willow Hetrick salixak@gmail.com	Remote Location, Climate Change, Funding/support	Improved communication between tribes, landowners, and management agencies. Information sharing	Remote location climate change consequences
	North Pacific Rim Housing Authority	Olen Harris olen@nprha.com	Community Planning, affordable housing	Comprehensive Plans help guide sustainable long term development	Housing and development
Tyonek Tribal Conservation District	Tyonek Area Watershed Action Plan	Christy Cincotta ccincotta@tyonek.com 907-646-9109 www.ttcd.org http://ttcd.org/programs/fish-passage-and-habitat-program /tyonek-area-watershed-action-plan/	Remoteness and accessibility, multiple landowners and stakeholders, need for increased monitoring	Stakeholder involvement, Best practices planning	Watershed impacts, water quality
Kenai National Wildlife Refuge	Comprehensive Conservation Plan	John Morton john_m_morton@fws.gov 907-260-2815 https://www.fws.gov/refuge/Kenai/ https://www.fws.gov/refuge/Kenai/what_we_do/resource_management /plans.html	Transportation, Commercial oil/gas, invasive species, Recreation, deforestation, wetlands drying,	Work for efficiently across boundaries – coordinated stream restoration, highway mitigation, weed management	Transportation, Commercial oil/gas, invasive species, Recreation, deforestation, wetlands

APPENDIX C: KENAI LANDS FORUM PARTNERSHIPS TABLE

Partnership	Mission	Information	Challenge	Opportunity	Climate Related Areas of Concern
All Lands/All Hands	Collaborative multi-year action plan to reduce wildland fire risks	Kristi Bullock Sue Rodman	Collective way for federal and nonfederal partners to share data, need for stakeholder liaisons	Meet bi-annually to identify needs and form working groups	
Kenai Peninsula Cooperative Weed Management Area	Control, prevent, and eradicate invasive plants	Matt Steffy www.homerswcd.org www.kenaiweeds.org http://www.kenaiweeds.org/user_images/KPCWMA_strategic_plan_with_appendices%202013.pdf	Weeds do not respect artificial boundaries Funding	More agency involvement (the more members the better) Comprehensive Education Plan	Invasive species, Landscape changes
Kenai Peninsula Fish Habitat Partnership	Protect, maintain, restore, and enhance fish habitat	Jack Sinclair jack@kenaiwatershed.org www.kenaofishpartnership.org	Balancing fish, people, and economy	Expanding their projects to impact more communities and areas	Fish habitat, Economy
Kenai Mountains-Turnagain Arm National Heritage Area	Protecting and promoting the cultural, historical and natural assets of a region	Kaylene Johnson-Sullivan Laylene.johnson@gmail.com 907-360-0480 www.kmtacorridor.org	Recruiting agencies to main the trails, Connecting and crossing jurisdictional boundaries Federal funding in 2018	Connecting trails between federal, state, and borough lands	Changing lands
Kachemak Bay water Trail	125 mile water trail that inspires exploration, understanding, and stewardship of Kachemak Bay	Robert Archibald kbwt@homeralaska.org http://www.kachemakbaywwatertrail.org/	Future funding	Working with private partners	Wildlife habitats, Ocean changes, Outdoor recreation
Kenai River Comprehensive Management Plan	Facilitate expression of opinions and take recommendations on matters pertaining to State parks and outdoor recreation	Ted Wellman tedwellman@exede.net	Update 20 year old management plan Incentivizing policy makers to follow the management plan Commercial vs public use	Communicating between the general public, other government agencies, and State Parks	Changing lands, Outdoor recreation
Mountains to Sea Partnership	Promoting anadromous riparian corridor connectivity	Mandy Bernard m2s.alaska@gmail.com	Dependent on willing landowner participation, ongoing funding needs, information needs(geospatial)	Capacity and cooperation across multiple organizations	

APPENDIX C: KENAI LANDS FORUM PARTNERSHIPS TABLE

Kenai and Homer Soil & water Conservation Districts	Provide education and leadership in the conservation and sustainable use of soil & water related resources	Heidi Chay (Kenai) 907-283-8732 x 5 www.kenaisoilandwater.org Kyra Wagner (Homer) 907-235-8177 x 5 www.homerswcd.org	Information sharing between agencies and to the general public	Engage district partners	Soil & water conservation, Food Security, Changing habitats
U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program & Fish Passage Program	Habitat enhancement, restoration, and protection on private lands Address barriers to fish passage	Kyle Graham Kyle_graham@fws.gov 907-260-0130	Invasive species	Hold relationships and stories that are working Work with Kenai Peninsula Fish Habitat Partnership	
Role of Land Trusts	Conserve lands with significant natural, recreational and/or cultural values - in perpetuity	David Wigglesworth David_wigglesworth@fws.gov 907-786-3925 www.kachemaklnadtrust.org www.greatlandtrust.org www.conservationfund.org	Leveraging of resources to support conservation as an element of land use planning	Sharing of data sets relating to community assets, as well as habitat, species, wetlands, and other attributes	Changing Lands
NW and North Pacific Landscape Conservation Cooperative	Planning for entire landscapes	Amanda Sesser Amanda_robertson@fws.gov www.nwblcc.org Mary Mahaffy Mary_mahaffy@fws.gov www.porthpaciflcc.org	Meeting fatigue, limited budgets, limited time for landscape scale work	Adaptive Management, Developing fruiter scenarios (land use and climate change)	Terrestrial and Aquatic ecosystems, Biodiversity, Coastal communities
Stream Watch Volunteer Program	Education about ethical angling, bear awareness, and river stewardship Restoration projects, trash removal, and monofilament recycling	Marion Glaser https://www.kenaiwatershed.org/streamwatch	Fundraising and applying meaningful work to match agencies funds	Adding more collaborative partners and increasing number of volunteers	River ecosystems, Outdoor recreation

APPENDIX D: STRATEGIES TABLE: HOW TO FIX THE LEAKS Topics: *infrastructure, water resources, habitat conservation, food security*

Long-term Outcome *Condition* What do you ultimately hope to achieve? Think about our vision and desired future.	**Mid-term Outcome** *Action* What do people do? (behavior change)	**Short-term Outcome** *Learning* What do people value or understand?	**Strategy** *Activities* What you will do?	**Strategy** *Outputs* What will you produce?	**Partnerships** What organizations or individuals need to be involved?	**Frameworks & Timing** What existing plans & processes? What stage are they in? (planning, implementation, idea…)
Resilient transportation: Intermodality & Multimodality	Fixing the 1 road problem through consideration of: - Marine	Getting citizens involved with planning processes; overcoming civic apathy, Community outreach activities.	Encouraging more marine transportation both in Homer & ANC Possible improvements to dock to increase capacity	More redundancy/options for transportation of goods and people	Port & Harbor Director Work with both Anchorage and Homer	See work of recent Homer deep water dock feasibility study
Resilient transportation: Intermodality & Multimodality	Fixing the 1 road problem through consideration of: - Roads (incl. bridges)	Getting citizens involved with planning processes; overcoming civic apathy, Community outreach activities.	Encourage Homer participation in a DOT infrastructure investment decisions (through carrots, radio, ads, etc)	(Hopefully) more resilient siting and implementation of roads and bridges	KPB Land Management DOT	
Resilient transportation: Intermodality & Multimodality	Fixing the 1 road problem through consideration of: - Road (incl. bridges) - Air - Rail - Marine	Getting citizens involved with planning processes; overcoming civic apathy, Community outreach activities.	Form regional collaborative e.g., "KMATS" (see AMATS program in Anchorage) w/ convening and outreach functions	Plan for citizen engagement Climate adaptation as hazard mitigation (multi-hazard focus) in HMPs	Kenai, Homer KPB Land Management DOT	See Anchorage Municipal Transportation System as analogue
Resilient Energy Infrastructure	People implement alternative energy options - Natural Gas - Steam - Hydro - Tidal - Small scale wind	People understand options and prioritize resilient (local or diverse) energy options	Connection to Anchorage Purchase Agreements Getting people involved when input is requested, resilience is on agenda	Abundant capacity Feasibility studies for tidal power Small scale wind Home based energy systems		

APPENDIX D: STRATEGIES TABLE: HOW TO FIX THE LEAKS Topics: *infrastructure, water resources, habitat conservation, food security*

Long-term Outcome *Condition* What do you ultimately hope to achieve? Think about our vision and desired future.	**Mid-term Outcome** *Action* What do people do? (behavior change)	**Short-term Outcome** *Learning* What do people value or understand?	**Strategy** *Activities* What you will do?	**Strategy** *Outputs* What will you produce?	**Partnerships** What organizations or individuals need to be involved?	**Frameworks & Timing** What existing plans & processes? What stage are they in? (planning, implementation, idea…)
Clean drinking water for all users	People minimize contamination -wells -reservoirs	-People understand how water/waste connect and cause contamination -Maintain Bridge Creek Reservoir -People understand importance of wetlands/stream setbacks	-Develop conceptual model of water cycle that includes septic, wells and groundwater recharge on a watershed scale -Buy land as available around Bridge Creek- expand zoning	-Groundwater resources geospatial layer for KPB Parcel Viewer -Lab tests for groundwater contamination	-Private Landowners -Land Trusts Municipalities -DEC- training and testing -Cook Inletkeeper	Bridge Creek Land
Abundant Drinking Water -Reservoirs -Springs -Wells	People practice water conservation Development of local holding capacity of rainwater -Holding Tanks -Cisterns	People understand individual water conservation methods -low flush -drip irrigation People understand alternative water storage and recycling methods	Educate on conservation methods Work with businesses and to carry products and offer trainings on local storage methods (raingardens, rain barrels, etc.)	Classes Trainings Brochures	Homer Soil and Water Conservation District Local Businesses Private Landowners	
Increased capacity to move stormwater	Cooperation on culvert replacement to larger sizes	-People understand individual actions to improve stormwater drainage (no grass clippings or dumping in ditches)	Educate on individual practices and Stormwater Management Practices	Brochures for landowners on best practices (individual actions)	Woodard Creek Coalition City of Homer	
Waste Management System (New plan that offers guidance to move stormwater)	Once city has capacity to move more stormwater, people utilize stormwater system to move floodwater and not burden waste water system	Site Specific education on stormwater discharge during storm events	Identify and work with homeowners who discharge stormwater into the wastewater system	New plan for outreaching new regulations or rules	City Developers Landowners	

APPENDIX D: STRATEGIES TABLE: HOW TO FIX THE LEAKS Topics: *infrastructure, water resources, habitat conservation, food security*

Long-term Outcome *Condition* What do you ultimately hope to achieve? Think about our vision and desired future.	**Mid-term Outcome** *Action* What do people do? (behavior change)	**Short-term Outcome** *Learning* What do people value or understand?	**Strategy** *Activities* What you will do?	**Strategy** *Outputs* What will you produce?	**Partnerships** What organizations or individuals need to be involved?	**Frameworks & Timing** What existing plans & processes? What stage are they in? (planning, implementation, idea…)
Sustainable Salmon Streams	Protect riparian habitat and connection to landscape and how that works, identify what is destroying habitat, where is critical habitat (spawning habitat), educate ourselves before we educate the public about specifics	Develop local culture that wants to do more than 50 foot anadromous habitat buffer (only legal constraint) otherwise dependent on regulations and politics, public education, so that people are changing the way they are building their house, managing their own property	Celebrate salmon with engaging "fun" activities Educate on salmon support system Establish Conservation Regulations Salmon Stewardship cost sharing Methods to assess value of something collectively	Education materials and opportunities Borough Code Revision Understanding codes workshop from the borough, Local option zoning code guidance Working group (similar to forest management groups) Salmon stewardship plan Salmon stewardship fee	KB Watershed collaborative, Borough, city, land assessors	Comp plans Land management plan -incentives (tax) -local option zoning -forest stewardship grants
Sustainable Moose Populations	People protect Riparian habitat People preserve whole watershed support system	People understand and value both the 50' stream buffer as well as the support system beyond the buffer	Celebrate salmon with engaging "fun" activities Educate on salmon support system Establish Conservation Regulations -incentives (tax) -local option zoning -forest stewardship grants Salmon Stewardship cost sharing	Education materials and opportunities Borough Code Revision Salmon Stewardship cost sharing plan	KPB Watershed Groups City State	Borough Comp Plan currently under review Borough Land Management Plan Ag land trust Moose Habitat Inc Bradley Lake hydro project

APPENDIX D: STRATEGIES TABLE: HOW TO FIX THE LEAKS Topics: *infrastructure, water resources, habitat conservation, food security*

Long-term Outcome *Condition* What do you ultimately hope to achieve? Think about our vision and desired future.	**Mid-term Outcome** *Action* What do people do? (behavior change)	**Short-term Outcome** *Learning* What do people value or understand?	**Strategy** *Activities* What you will do?	**Strategy** *Outputs* What will you produce?	**Partnerships** What organizations or individuals need to be involved?	**Frameworks & Timing** What existing plans & processes? What stage are they in? (planning, implementation, idea…)
Sustainable Mariculture	Identify where pens/farms can go to ensure they have least environmental impact but are also successful businesses	People understand: How to select species, technology and sites How to start and sustain small businesses Harmful and helpful conditions necessary (relationship to algal blooms, nutrient circulation) for operations	Long term monitoring Species selection Technology selection Water Protection	Small business strategic planning Skill building and marketing opportunities Local economy support Data to support the selection of sites that are good for the production of food and environmental conservation Data to support the selection of species for mariculture operations	Alaska Sea Grant	
Sustainable Agriculture	Strong local economy of small businesses	Fostering local economy- small business	Grow Local Seed Small building planning support Connecting momentum around salmon conservation to small agriculture Outline a sustainable dairy industry Manage water use Site Selections Develop Share Program: Livestock	Infrastructure to connect with farmers Skill building business plan Connect local ag (produces) to local restaurants (consumers) Cooking classes to learn how to cook local food (Food book club)	Land Grant Facebook Social Media Small business bureaus	City Comp Plan Borough Comp Plan Borough Land Management Plan (CAP built in)
Sustainable wild harvest	Invasive/non-native species are managed and do not impact wild foods		Monitor for invasive/eruptive species Reframe salmon issues as food security issues		Cattlemen's association NRCS, HSWCD Alaskan Harvesters Social Media	
Grow local seed	Species are selected to grow that are acclimatized				Connectors Infrastructure aid	City Action Plan

APPENDIX E: GAME OF FUTURES

Game of Futures

Goal of Game: Determine if adaptation strategies are robust under different climate scenarios.

Materials

- Dice (1 / group)
- Pieces of candy/trinkets (represents agency and community resources)
- 4 future scenario narratives developed by experts/stakeholders describing potential impacts
- Several adaptation strategies that are seriously being considered as part of a planning process
    - Game is most useful when applying the scenarios to actual management approaches being considered by a community, making the outcome of the game more tangible.
- Prizes for winners (optional)

Set-up

Forming groups that represent individual agencies

- Break the room into groups of approximately 5 people
- Each group represents an agency with a specific mission (e.g., stormwater management agency, natural resource management agency). The groups can represent actual agencies in the room (e.g., each group made up of representatives from a specific agency or department) or it can be hypothetical (e.g., facilitator assigns people to random agencies).
- Each individual in a group will then choose an adaptation strategy to implement (either actual strategies being considered for implementation or hypothetical strategies assigned by the facilitator). Each individual in each group should have a different strategy. The more specific diverse the strategies the better.

Reconfiguring groups that represent diverse communities

- Then have the people in each group count-off 1-5. The room is then broken into new groups based on their numbers- all the ones form a group, all the twos form a group, and so on. The new groups should be made up of at least one person from each different agency (e.g., one individual from the stormwater agency, one individual from resource management agency…).
- The new group represents a community of different agencies/ organizations with different missions and values. Each individual in the group is a representative of a different agency.
- Have individuals introduce themselves to the new group, outlining what agency they represent, and the adaptation strategy they have chosen to implement.

Providing each community with resources

- It is assumed that each agency (individual) had the funding and capacity to initially implement the strategy.
- Each person (agency) is given 5 pieces of candy/ trinkets. This represents the total money an individual/ agency has to repair, maintain, or modify the adaptation strategy as climate change is experienced.

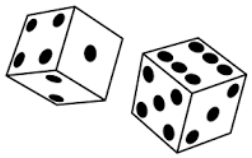
How to win the game

- There will be one **individual winner** within each group that is the agency with the most resources remaining (i.e, pieces of candy/ trinkets). This means this agency chose a strategy that required the least maintenance and modification over the long-term, proving to be resilient in multiple scenarios.
- There will be one **group winner** out of all groups that is the community with the most resources remaining (i.e, pieces of candy/ trinkets). This means this community chose strategies that required the least maintenance and modification over the long-term, proving to be resilient in multiple scenarios.

Let the game begin…

Step 1: What is our future?

Handout the scenario narratives now. *Facilitator note: Don't hand these out before now as it confuses people if they get these too early in the process.*



- **One person roll the dice 5 times**
- **Write down what number is rolled each time**

Each roll of the dice represents an event that causes our current state to be pushed towards a specific scenario.

One event will likely not push you into a new scenario but cumulative effects overtime may alter the "state" in which we manage. So:

- **Add up what you rolled for your final score**
  - Ex. Participant 1 rolled 1+2+3+4+5+6 = 21
- **Determine what scenario you are in using the table below**

	Current State Maintained	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Total	5 - 9	10 - 14	15 - 19	20 - 24	25 - 30

Step 2: Is my agency's strategy still effective?

If your community moves into a new scenario, reflect on the changes outlined in that scenario (refer to scenario narratives). Is each individual's strategy still effective in light of changes within the scenario?

- What strategies are successful in the new scenario? Why or why not?
- If not successful, can it be altered to be effective in the scenario?
- Or can it be combined with another strategy to be more effective?

Fill out your **worksheet**, as you discuss what the new scenario means for your chosen strategy.

Step 3: Do I need to pay to modify my strategy?

The group will decide what strategies are successful and which ones are not based on their knowledge of the community and best-available science.

- If the group decides a strategy works then the participant does not have to pay for modifications.
- If the group decides a strategy does not work and needs to be altered in some way then the participant has to pay one of its pieces of candy to the bank (center of the table).
- If the group is undecided that participant has to roll the dice.
  - Roll an even number and your strategy works
  - Roll an odd number and your strategy does not work, and you owe the bank one piece of candy.

Repeat with each participant. Keep repeating until all four scenarios have been explored by the group.

Wrap-up and reflections

Begin by determining who the individual and group "winners" are. If multiple people or groups seem to have been successful, begin a discussion around why those individuals/ groups were successful. Then the facilitator continues to guide a discussion amongst all participants to elicit what lessons were learned throughout the process. Sample prompting questions below:

- What strategies seemed to be the most resilient?
- Community vs. individual (agency) successes?
- How many rounds did your group complete? Why fast or slow?
- What did you struggle with throughout the game?
- Was there one scenario that seemed to be particularly difficult for your agency or community?

The following climate adaptation games guided the development of this:

- *Game of Floods.* County of Marin Community Development Agency. http://www.marincounty.org/depts/cd/divisions/planning/sea-level-rise/game-of-floods
- *Decisions for the Decade Game.* Rand Corporation, Robert Lempert and USC Sea Grant, Juliette Hart. Session at the California Adaptation Forum- *Decisions for the Decade: Serious Games for Gnarly Problems (*Sept 7, 2016).

Worksheet: *Climate Scenarios Game of Futures*
Topic, agency or community:

Strategy	**Solves a current problem?**	**Successfully addresses changes outlined in …** Scenario A?	Scenario B?	Scenario C?	Scenario D?	**Are there ways to adjust the strategy, so that it does work in every scenario?** • **Combine with another strategy?**	**Knowledge gaps/ research needs**
1.	☐ Yes ☐ No ☐ Unsure	☐ Yes ☐ No ☐ Unsure Why?	☐ Yes ☐ No ☐ Unsure Why?	☐ Yes ☐ No ☐ Unsure Why?	☐ Yes ☐ No ☐ Unsure Why?		
2.	☐ Yes ☐ No ☐ Unsure	☐ Yes ☐ No ☐ Unsure Why?	☐ Yes ☐ No ☐ Unsure Why?	☐ Yes ☐ No ☐ Unsure Why?	☐ Yes ☐ No ☐ Unsure Why?		