Preparing East Coast Fishing Communities for an Era of Climate Change

Scenario Planning Toolkit

July 2023

Scenario Planning Toolkit: Background

Scenario planning is a tool used by organizations to prepare for a future of uncertainty.

From 2021-2023, several East Coast fishery management organizations collaborated in a scenario planning process involving several hundred stakeholders. The objective was to explore how fisheries and governance would have to change to prepare for an era of climate change. The results of that exercise are highlighted on the East Coast Climate Change Scenario Planning webpage, and are described in more detail in the East Coast Climate Change Scenario Planning Summit Report and Potential Action Menu linked on that page.

The process was valuable for fishery managers – and it can be replicated by and for other other stakeholder groups who want to explore how climate change (and other factors) might affect their future. It doesn't need to take 2 years! You can hold a helpful scenario conversation in a 1 or 2 day session, or even a meeting lasting a couple of hours.

This toolkit is designed to be used by any East Coast fishery stakeholder. It briefly summarizes the ECSP scenario work and offers suggestions for how other groups can use the material to have valuable conversations about the challenges of climate change.

Scenario Planning Toolkit: Table of Contents

The following sections of slides can be used depending on the goal of the scenario conversation, and the time available

The reason why we need scenarios: we’re not good at thinking about the future

What is scenario planning? A way of asking better questions about the future

- What **will** happen?
- What **should** happen?
- What **might** happen?

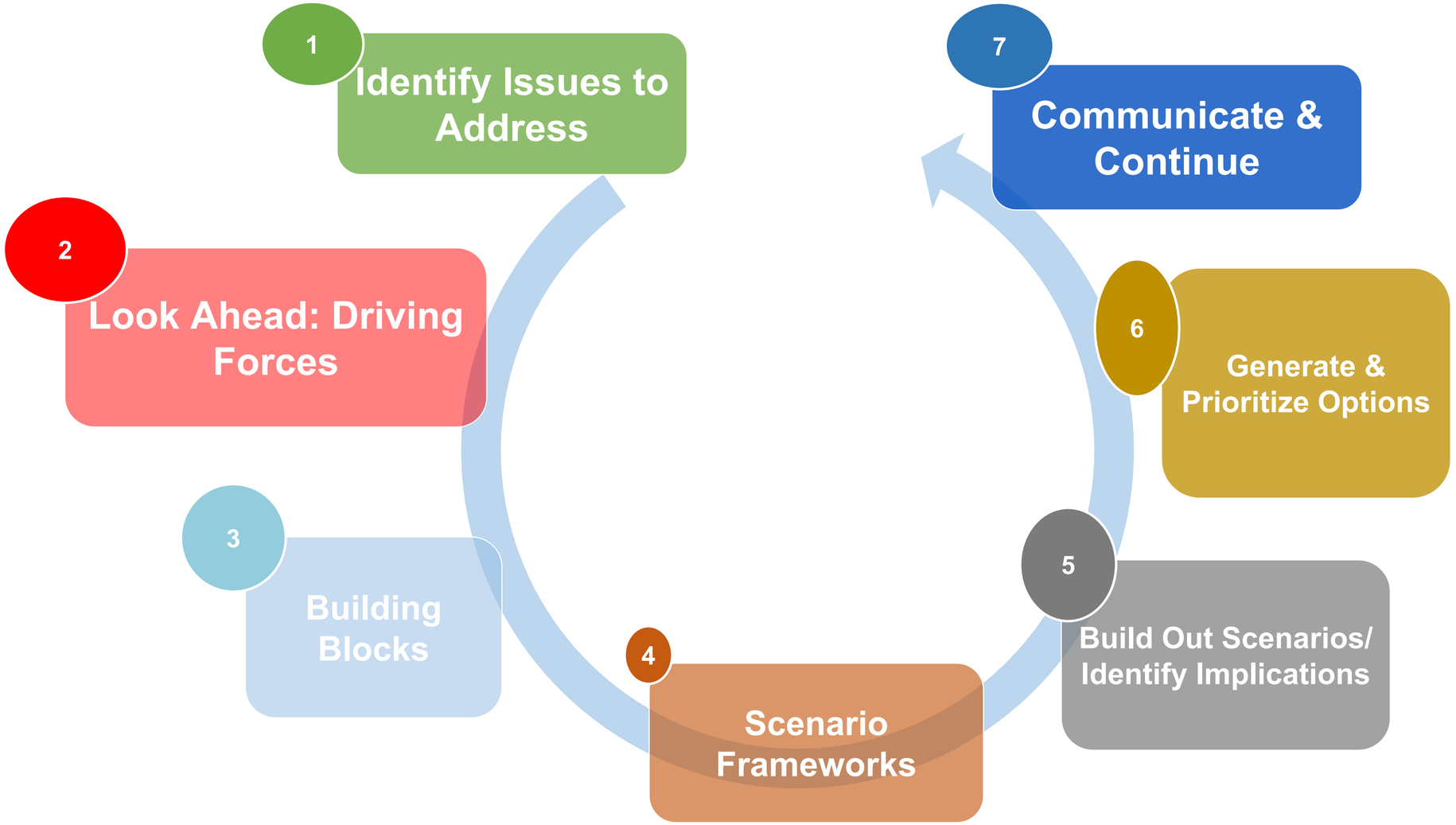
"Scenarios are stories about the ways that the world <u>might</u> turn out tomorrow…"

"Scenario planning uses provocative stories about the future to help change the minds and actions of a group of people"

Benefits of scenarios

1. Quicker reactions to a changing world
2. Early and broad risk identification
3. Innovative ideas
4. More considered decisions and flexible plans
5. Trust-building and alignment towards a preferred future

Steps in a Scenario Process



Step 1: Identify Issues to address

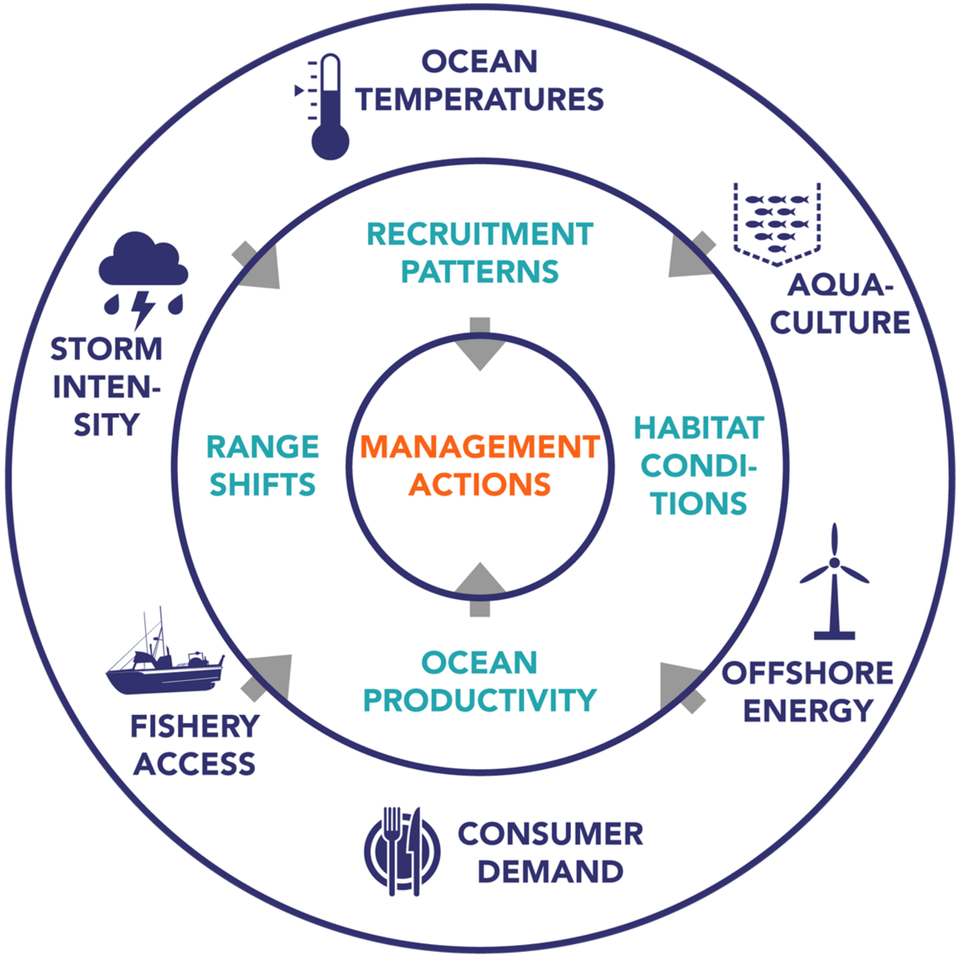
Scenario planning should always be used for a reason (not just for the sake of “doing scenarios”).

Any organization or group should ask the question: what’s the problem to solve?

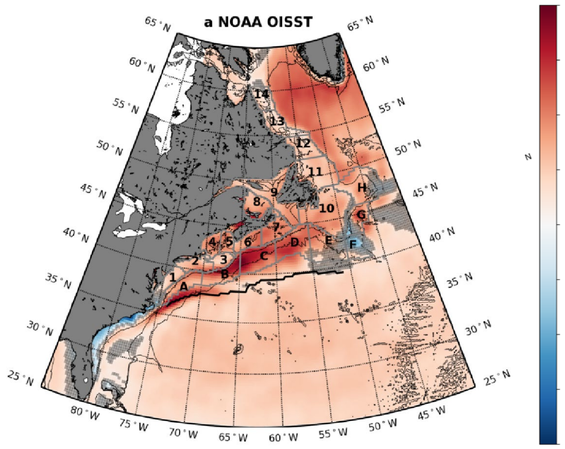
For the ECSP process, fishery managers wanted to look in detail at how *governance and management issues will be affected by climate driven change in fisheries, particularly changing stock availability and distributions.* The scenarios focused on exploring how climate change might affect east coast fisheries over the next 20 years.

In using these scenarios with other stakeholders, be sure to consider “why” the scenarios can be valuable. **What are the issues to address – or the challenges / problems that need to be solved?**

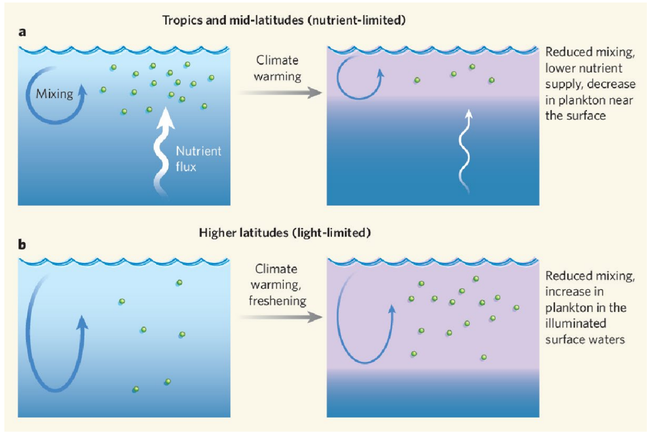
Step 2: Looking Ahead - Outside-In Thinking



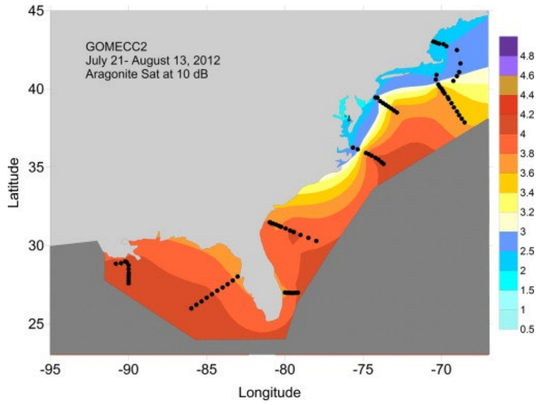
Physical Drivers of Change



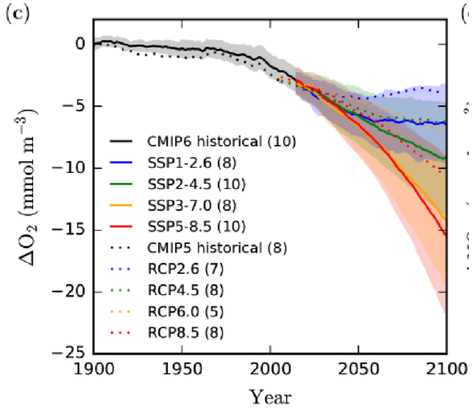
Rapid warming across much of the East Coast



Climate change affects net primary production, varies with latitude



Acidification in upper ocean, but impact on shell formers more connected to water saturation

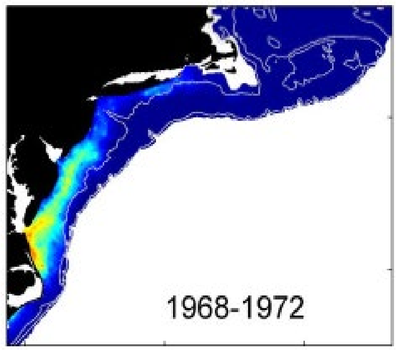


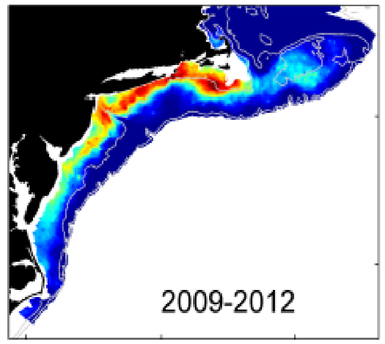
Warming and stratification lead to widespread oxygen declines

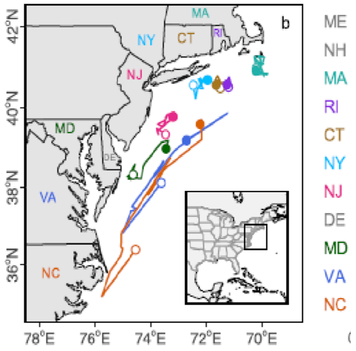
[Oceanographic Drivers of Change Webinar Briefing February 2022]

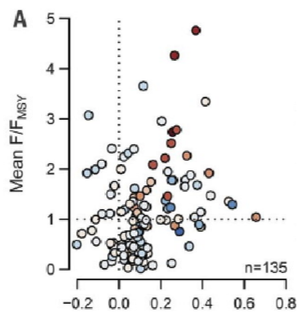
Slide extracts from Charlie Stock's webinar presentation

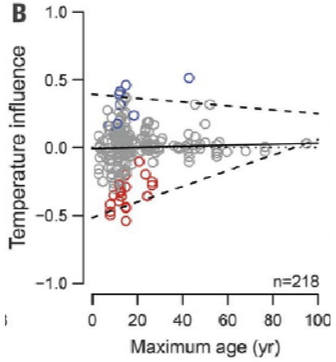
Biological Drivers of Change

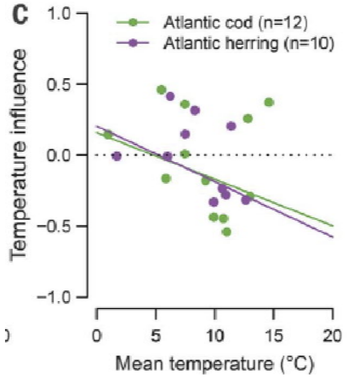


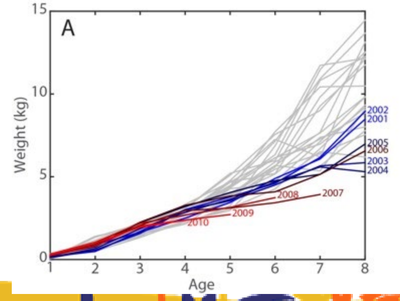


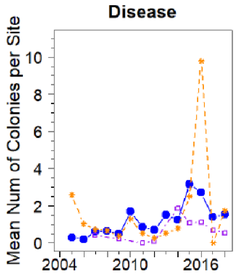


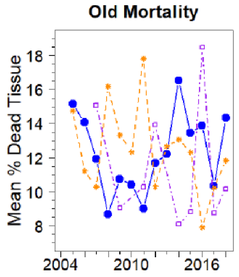












Most species have shifted their distribution, often driven by temperature. We've also seen changes in migration timing.

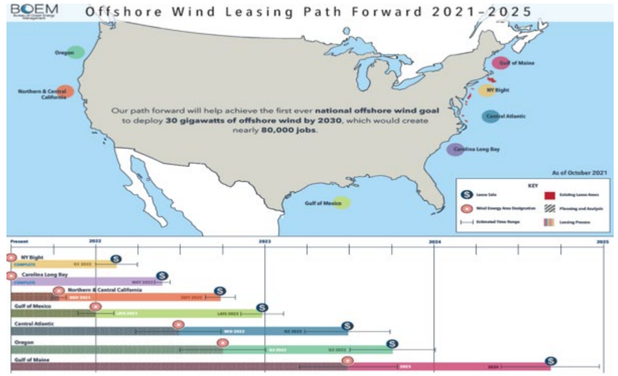
Warming has influenced stock productivity, with larger influences on overfished populations. More significant responses in populations with faster life histories. Negative influences of species at the southern end of their range

Many species body sizes getting smaller. Disease becoming more prevalent. Combined effects of warming, acidification and hypoxia can be synergistic.

[Biological Drivers of Change Webinar Briefing February 2022]

Slide extracts from Janet Nye's webinar presentation

Social & Economic Drivers of Change



Demand / market conditions are shaped by: changing consumer preferences; new technologies creating alternatives to wild-caught / local seafood; international trade / supply chain issues

Fisheries might also be affected by: commercial ocean activity (e.g. offshore wind) ; population growth in coastal towns; demand for scarce waterfront space; various regulations

Fuel costs, crew wages, distances to port, availability of support services likely to affect business viability and ability to adapt to changing conditions

[Social & Economic Drivers of Change Webinar Briefing March 2022]

Slide extracts from Doug Lipton's webinar presentation

Step 3: Scenario Building Blocks

Pre-determined Elements

Factors or forces that are ‘locked-in’ and confidently predictable over the time horizon

Critical Uncertainties

Important forces that have the potential to move in alternative directions over the time horizon

Wildcards

Low probability events and developments that could impact the future in significant ways in the time horizon

Predetermined Elements

1. Ocean temperatures continue to warm, affecting marine species biology & distribution
2. Regions exhibit differences in seasonal temperature changes
3. Primary production changes differently in different regions
4. Sea levels rise
5. Changing ocean uses create more competition for fisheries
6. Coastal population grows

Wildcards

1. Changes in ocean current systems
2. Series of extreme marine heatwaves
3. Series of Harmful Algal Blooms
4. Regime shifts caused by losses of critical food resource or changes in food web dynamics
5. Extreme market disruption (e.g. trade war, more pandemics)
6. Devastating hurricane

Critical Uncertainties

What might happen by 2042? Physical/Climate Uncertainties

Rapid warming in the NW Atlantic	◀	**1. Rates of ocean warming?**	▶	AMOC swings toward a cooler state, stalling warming trend
Major effects	◀	**2. Impact of saturation of calcium carbonate on shell-formation?**	▶	Minor effects
Minor changes	◀	**3. Extent of changes in the Cold Pool?**	▶	Significant reduction in size and duration
Become stronger but less frequent	◀	**4. Storm frequency and intensity?**	▶	Become much stronger and more frequent
Impacts limited to specific locations / times & some positive effects	◀	**5. Impacts of sea level rise?**	▶	Causes significant impacts to many facilities & habitats
Low, decreasing impact	◀	**6. Pollution & nutrient run-off in estuaries?**	▶	High, increasing impact

Critical Uncertainties

What might happen by 2042? Biological Uncertainties

Varies by species & region – hard to generalize and identify	◀	**7. Evidence of range expansion / contraction?**	▶	More evident, pronounced and consistent
Limited evidence of movement or unpredictable direction	◀	**8. Direction of species movements?**	▶	Mostly northwards / deeper waters
Limited, minor	◀	**9. Extent of range expansion / contraction?**	▶	Extensive, major
Low - species movement is not replaced by other emerging fisheries in the area	◀	**10. Replacement of moving species?**	▶	High - most species movement is replaced by other emerging fisheries in the area
Mostly maintained, worst effects on overfished populations	◀	**11. Stock production?**	▶	Declines markedly across many populations
Maintained / as now	◀	**12. Disease prevalence?**	▶	Much higher
Low	◀	**13. Extent of predation on key species?**	▶	High
Minor, occasional, generally manageable impacts	◀	**14. Impact of fishery interactions with protected resources or choke species?**	▶	Major, ongoing impacts

Critical Uncertainties

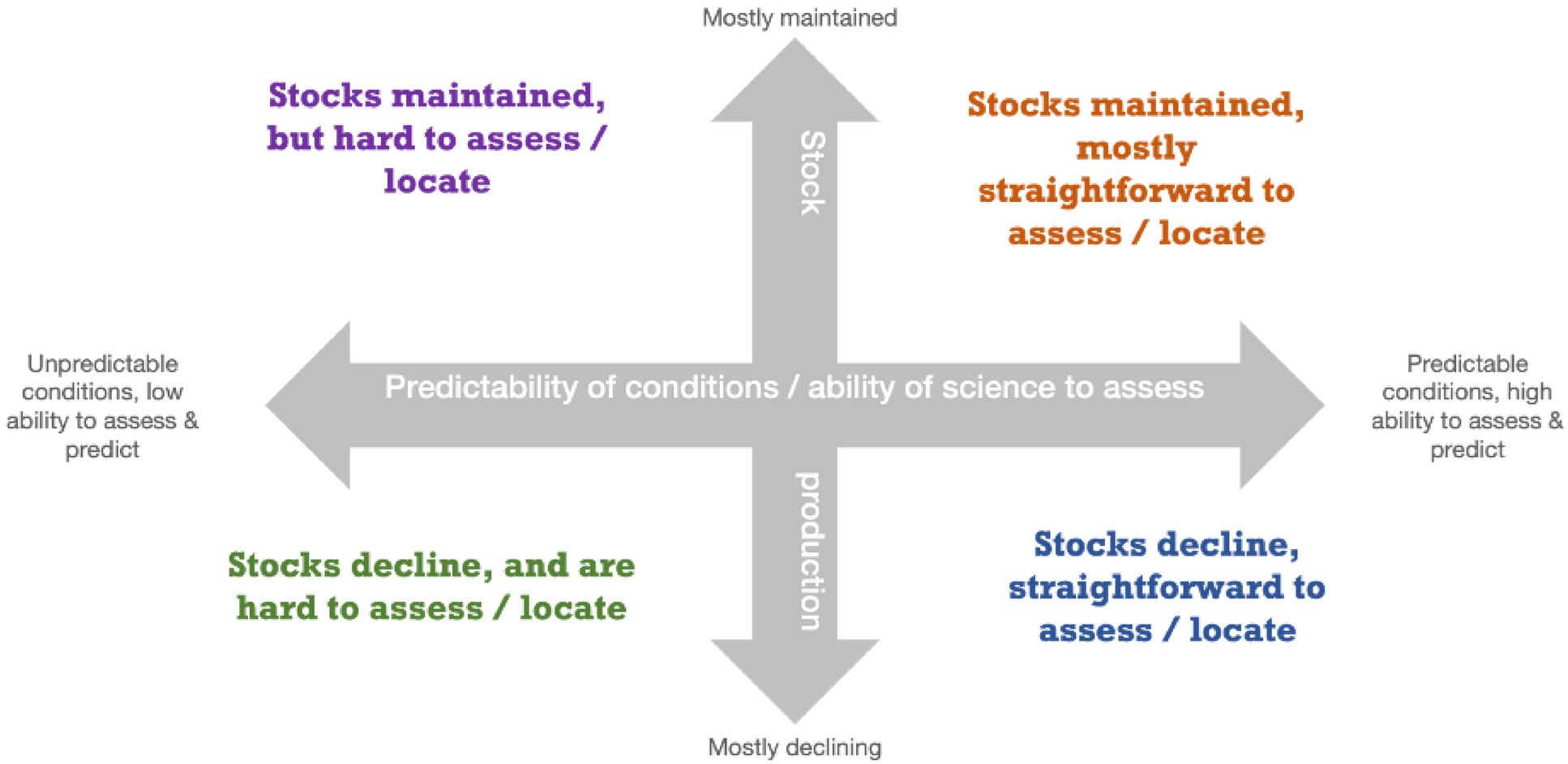
What might happen by 2042? Social & Economic Uncertainties

Moderate tech advances, used by few	◀	**15. Development and use of technology to support fisheries?**	▶	Widely available, used extensively (e.g. gear, tracking, vessels etc.)
Declining market and lower prices as market is saturated / highly competitive (e.g. aquaculture, lab-grown fish)	◀	**16. Consumer preferences for wild caught and local seafood?**	▶	Growing market and higher prices as wild caught / local becomes a premium market
Marginal or positive effects on species distributions / research efforts etc.	◀	**17. Impact of offshore wind installations?**	▶	Mostly damaging effects on species distributions / research efforts etc.
Costs are contained creating profitable opportunities for most	◀	**18. Fishing & related industry viability?**	▶	Costs rise more quickly than revenues for most operators
Limited coastal armoring as 'living shoreline' alternatives become popular	◀	**19. Extent and impact of coastal armoring?**	▶	Significant, with widespread effect on habitats
Leads to damaging competition and less prosperous fishing communities	◀	**20. Impact of alternative ocean uses, other coastal developments on fishing communities?**	▶	Leads to more prosperous coastal and fishing communities

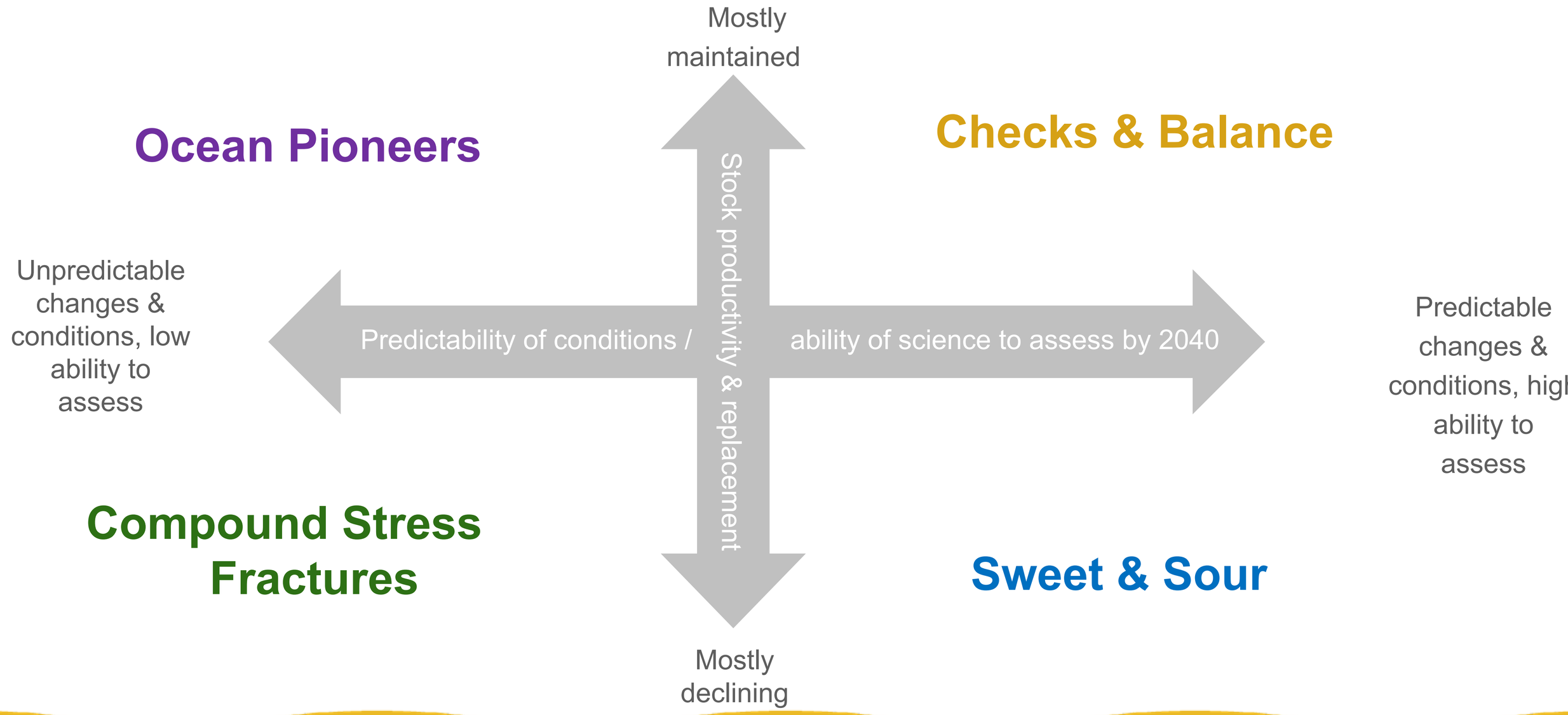
Key Uncertainties

Stock production/ Habitat/ Replacement species **Declining**	Levels/health of stock productivity	Stock production/ Habitat/ Replacement species **Maintained**
Regional	Patterns of distribution	Coast-wide
Unpredictable	Patterns of distribution etc.	Mostly predictable
Limited / unable to cope	Science ability to assess change	Adequate / improving
Mostly Low	Industry / Player Adaptability	Mostly High

Step 4: Scenario Framework



Step 4: Scenario Framework



Step 5: Scenario Details - Criteria for Good Scenarios

Plausible

each scenario has the potential to occur (even if the assessed probability is low)

Challenging

to most peoples' current conventional wisdom

Memorable

the main concept behind each scenario story is powerful and relatively easy to communicate

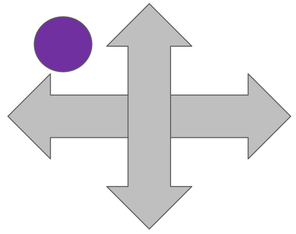
Relevant

to the challenge outlined in the scoping phase

Divergent

the scenarios are clearly different from each other, helping "stretch" thinking in different directions

Ocean Pioneers



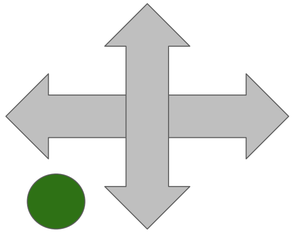
- Crazy ocean conditions & weird weather: pendulum swings, boom & busts
- Ocean is resilient –stocks are maintained (in aggregate) with no damaging climate tipping points

- Seasons and locations of traditional fisheries change unpredictably, leading to (e.g.) changes in interactions with protected species
- Traditional stock assessments are less reliable; real-time data from vessels and other users is more valuable than traditional science
- New assessment approaches generate questions over data rights and data aggregation

- Extreme weather often creates dangerous fishing conditions
- Ocean activity (fishing, aquaculture and offshore wind) dominated by entrepreneurs, technology, pioneers
- Winners typically have deep pockets, sharp elbows, new technology and a willingness to take risks

- Uncertainty about how long "abundant" stocks can keep delivering

Compound Stress Fractures

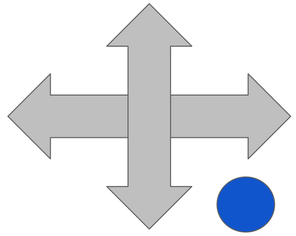


- Unpredictable conditions create climate tipping points with negative impacts to diverse harvest, forage and marine wildlife species
- Storms and population growth create more pollution, reducing the quantity and quality of estuaries and other nearshore habitat
- Diseases are prevalent – several marine heatwaves lead to die-offs

- High stress on fishing operators: costs rise and harvest opportunities are reduced due to low abundance of traditional stocks and new area closures to protect endangered species
- Science appears unable to help the fishery management community adapt; stock assessments rely on insufficient data and constant lawsuits drain management capacity
- Stocks experiencing range shifts are incorrectly classified as overfished; these mistakes undermine the management process
- Low levels of trust between several different stakeholder groups

- Conditions require operators to shift effort to lower trophic level species
- Government steps in to save some domestic fisheries, but only a few select fisheries get assistance
- Fishing no longer the dominant activity in the ocean, competing with other industries for space and attention

Sweet & Sour Seafood



- "Science is good, but the news is bad"
- Declining productivity and abundance for many species including harvest mainstays, choke species, and diverse marine wildlife; maximum fish size is smaller
- The cold pool continues to shrink in size and duration, negatively impacting diverse species that depend on this pelagic habitat
- Range shifts as species move N and E, but not much range expansion

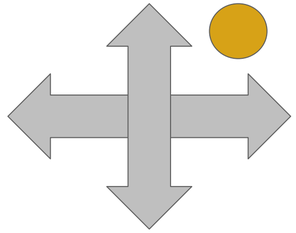
- In some regions, management puts limits on newly arriving species, allowing establishment of new reproducing populations; marine wildlife interaction/bycatch challenges are addressed through improved forecasts and fishing community innovation
- Successful small-scale fishermen adapt to reduced catch limits and new stocks, supplying limited but lucrative markets

- Unsuccessful regions struggle to develop effective responses to challenges like shifting stocks and new marine mammal interactions, leading to fleet consolidation, loss of markets to artificially cheap seafood imports, and the permanent decline of historic fishing communities.

- Aquaculture becomes prevalent as a mass source of seafood

Step 5: Scenario Details

Checks and Balance



- Predictable changes and tolerable conditions; sea levels rise gradually
- Range expansion as stocks move predictably north & east

- Climate mitigation efforts reduce greenhouse gas emissions, with little effect on ocean conditions in the short-term; however, better pollution reduction, habitat protection and restoration reverse a great deal of habitat damage and loss

- Science capacity booms, delivering effective ocean monitoring, real-time catch reporting, food web/population monitoring and bycatch avoidance
- Species composition has changed, but widespread data means that management can provide for a full and flexible balanced use of available fish stocks
- Investment in other ocean/coastal uses leads to competition (e.g. aquaculture) and collaboration (e.g. fisheries science is boosted by wind energy installations)

- Recreational sector is healthy thanks to stable productivity and increased coastal wealth, but gentrification creates concerns over accessibility

Steps 5 & 6: Implications and Options

SCENARIOS

What might conditions be like in 2042?

IMPLICATIONS

What challenges and opportunities does this scenario create?

OPTIONS

What changes / actions should happen now to prepare for future conditions like this?

Steps 5 & 6: Customized Implication Conversations

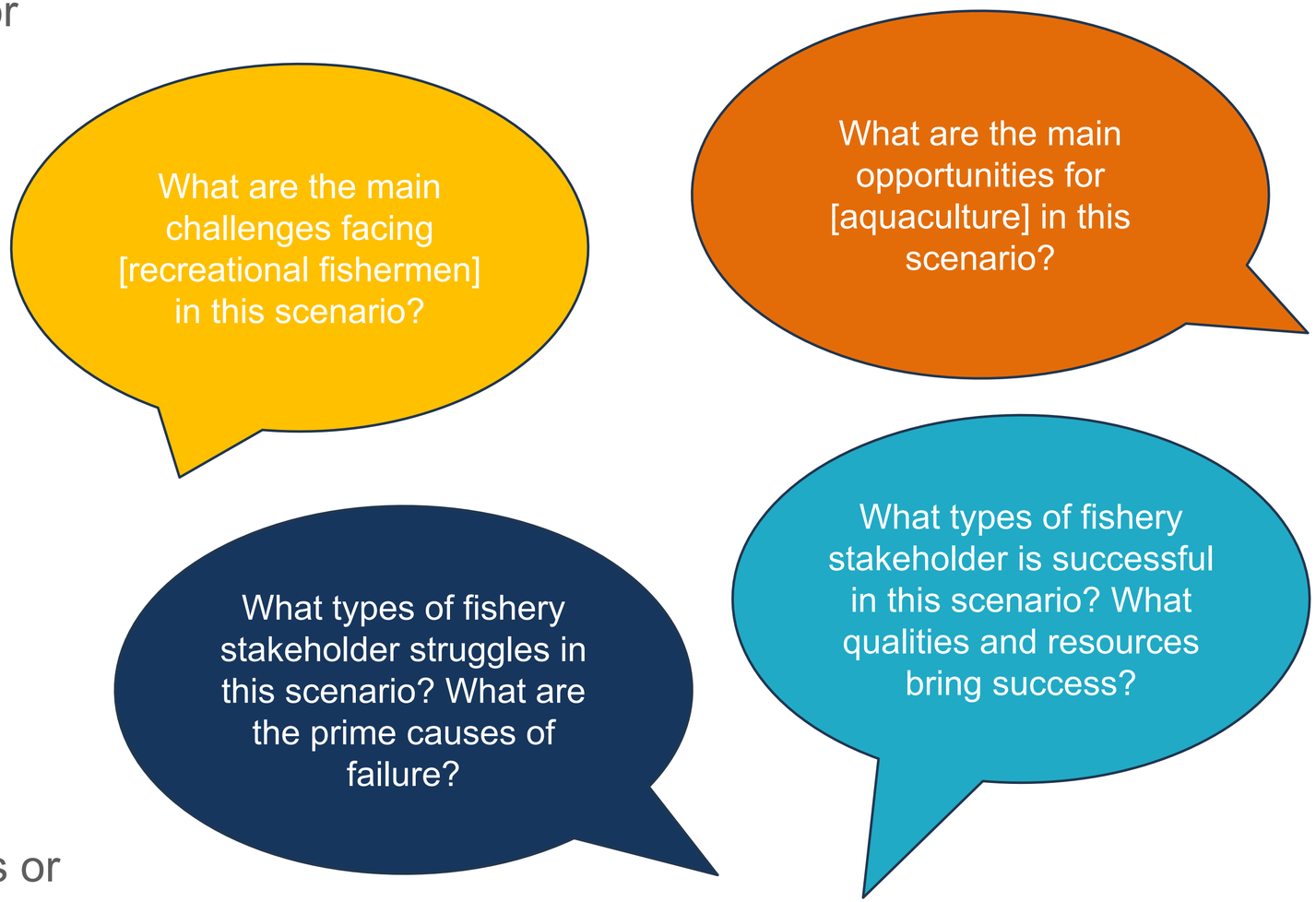
Implications conversations can be customized for specific audiences, for example:

- Commercial fishermen
- Recreational fishermen
- Coastal communities
- Fishery managers
- Alternative energy providers
- Aquaculture businesses

Or for specific roles, for example:

- harbormasters,
- charter businesses,
- tourism providers,
- local policy-makers

They can also be customized for specific regions or geographies



Step 6: Some suggested prompt questions – for options

For each scenario, given the challenges and opportunities,…

What new investments would you make?

What new markets or customers would you serve?

What types of skills / experience would you need to develop or recruit for?

What new practices would you need to learn and apply?

What new relationships would you build?

What changes in policies or regulations would you want to see?

What new information would you need to acquire?

What existing practices should you stop doing?

Step 6: ‘Placing Bets’ Across A Scenario Matrix

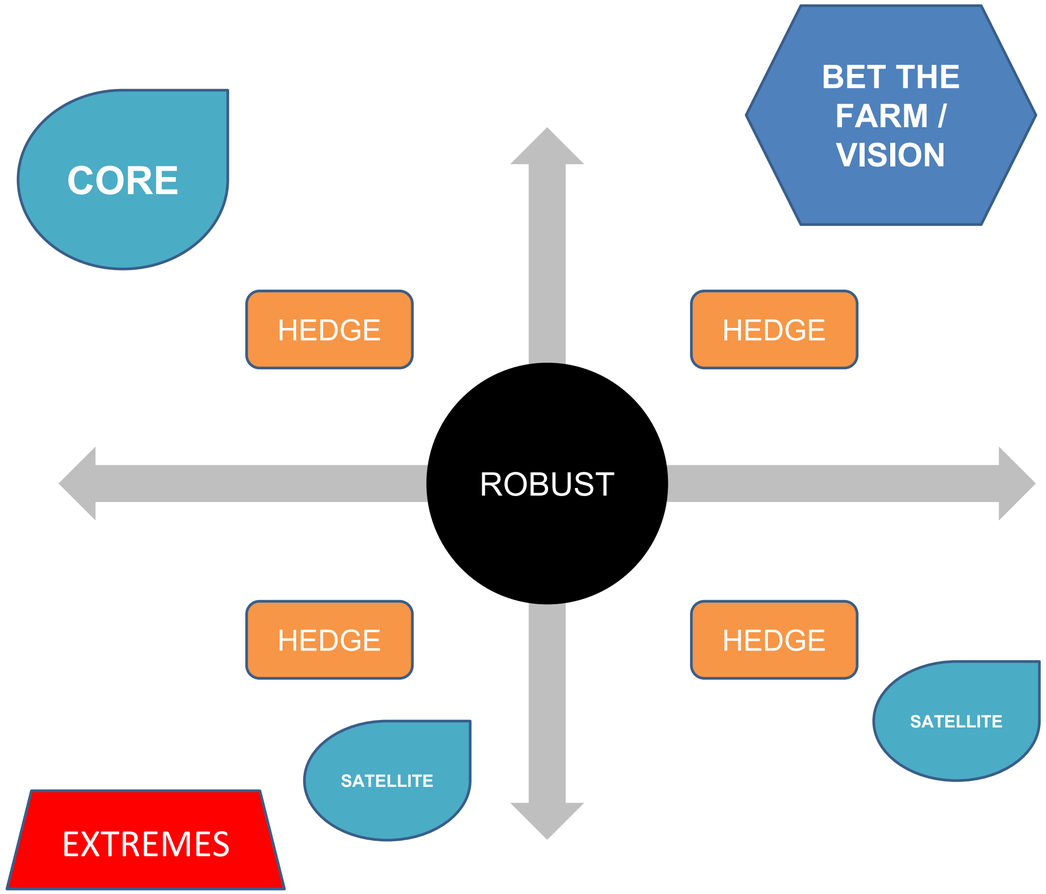
ROBUST: Pursue those options that would work out well (or at least not hurt you too much) in any of the four scenarios

HEDGE: Make several distinct bets of relatively equal size, then wait and see what happens

BET THE FARM/VISIONING: Make one clear bet that a certain future will happen — and then do everything you can to help make that scenario a reality

CORE/SATELLITE: Place one major bet, with one or more small bets as a hedge against uncertainty (experiments)

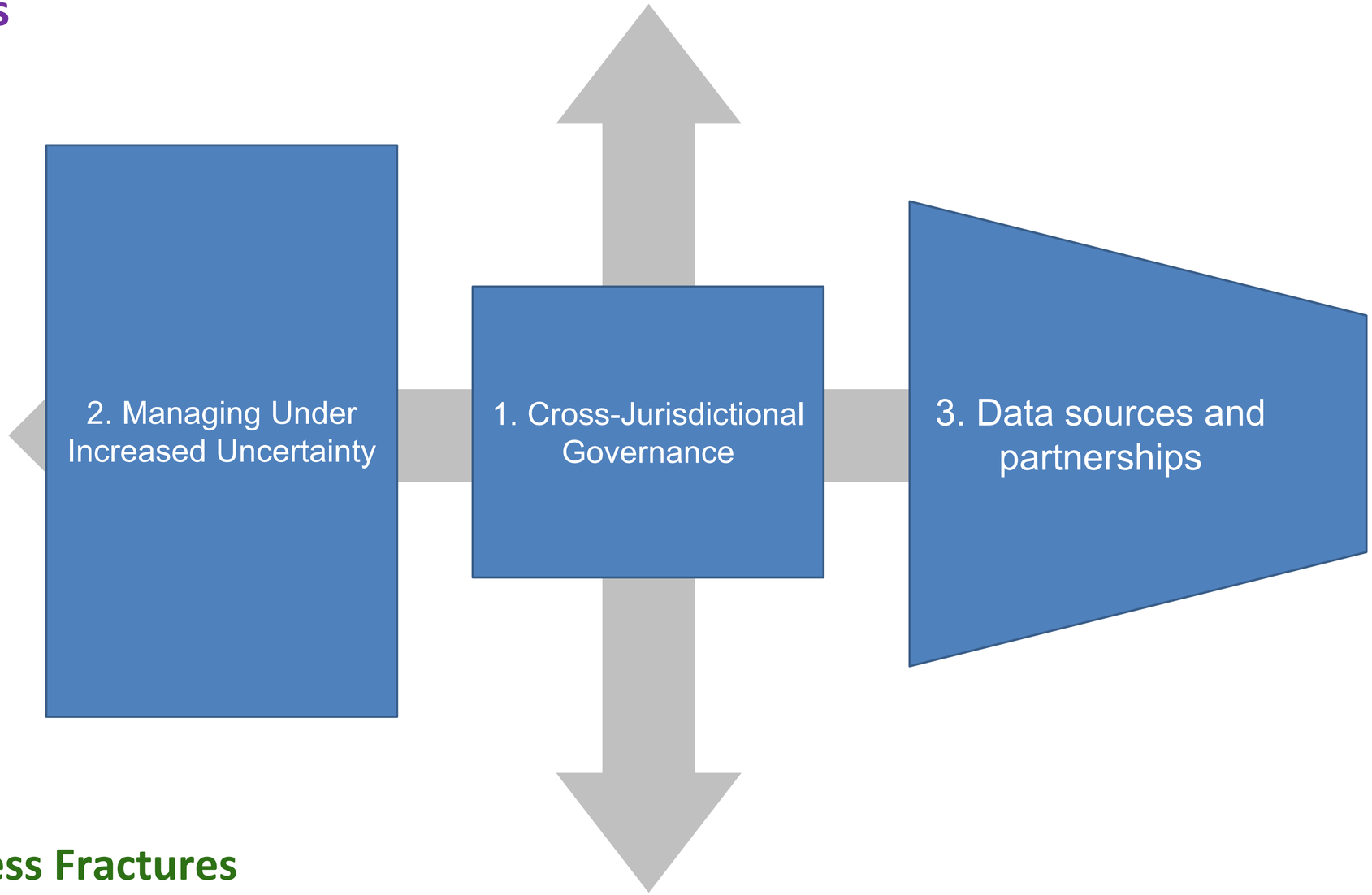
EXTREMES: Prepare for, or prevent, a worst-case scenario



Fishery Managers were concerned with…

Ocean Pioneers

Checks & Balance



Unpredictable changes & conditions, low ability to assess

Predictable changes & conditions, high ability to assess

Compound Stress Fractures

Sweet & Sour

More detailed decisions follow from there

Cross-jurisdictional Governance

Reevaluate Council committee structure, use, and decision making

Re-evaluate and potentially revise Advisory Panel representation

Develop joint management agreements with aim of clarifying roles and increasing efficiency

Improve coordination across NOAA offices and regions

Managing under Uncertainty

Identify ecosystem-level contextual information that can be considered within the management process to help incorporate climate information into decisions

Streamline FMP documentation and rulemaking

Data Sources and Partnerships

Expand study fleet, include recreational fisheries, and ensure data are used

Use survey mitigation around offshore wind to transition to industry-based surveys or other survey platforms

Improve the use of existing data.

Step 7: Communicating Scenarios

Step 7: Continuing Scenario Conversations

It is worth returning to the scenario framework at regular intervals following a scenario project. This can be done to address two separate goals.

First, periodically (e.g., annually) assessing the current state of conditions is useful for tracking change and determining if conditions are moving toward an identified scenario or in an unexpected direction.

Second, the scenarios can be used as a “wind tunnel” to assess how different management options being considered in a regulation could play out across the already identified plausible future scenarios.

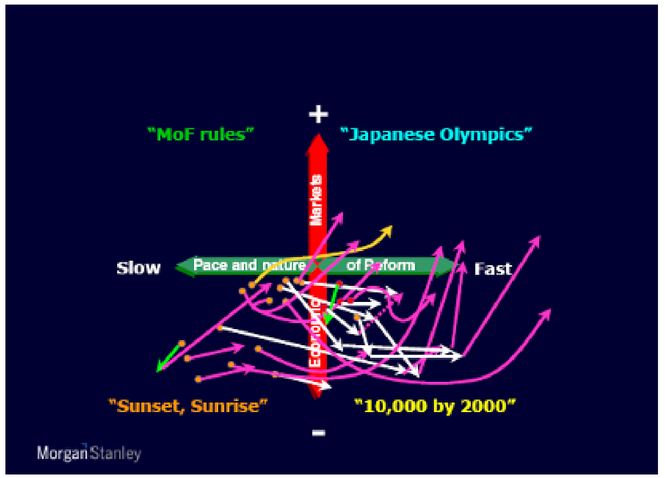
Continuing Scenario Conversations - Tracking Change

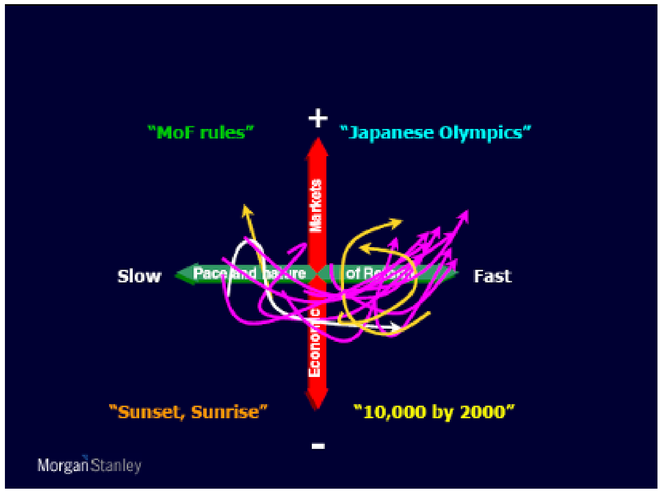
On a regular basis, groups should discuss whether conditions have changed, and whether a different or new scenario should now be considered

To do this, groups should track “indicators” - key developments and dynamics in the external environment that suggest that a particular scenario seems to be unfolding in the real world

For the ECSP scenarios, this will mean looking closely at evidence for changing ocean and stock conditions. As new evidence emerges about changing conditions, groups should consider if new actions are needed, or if existing practices should be changed. Maybe actions that were not prioritized in 2023 become more relevant in later years?

Continuing such conversations ensures that a plan remains flexible against changing conditions





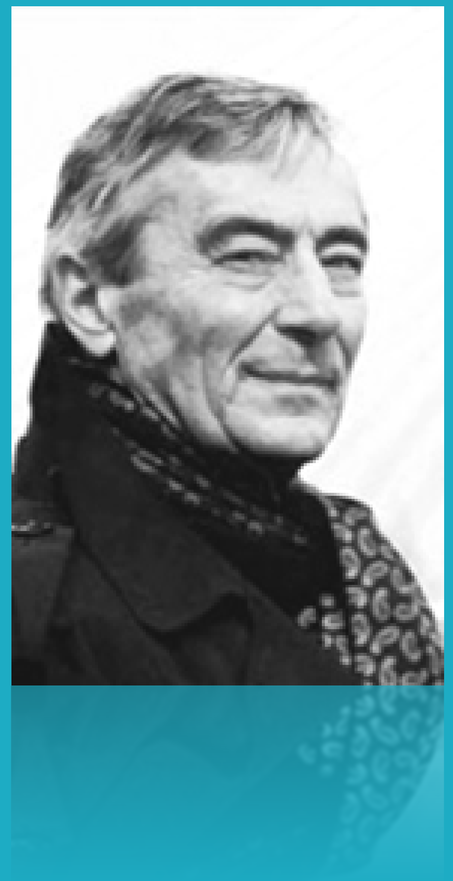
Managers decide and plot which way they think scenario trends are headed. This example taken from HBS Case Study: Morgan Stanley Japan, 2002.

Continuing Scenario Conversations - Wind Tunneling

When new regulations are being considered, groups should discuss how the alternatives being considered would play out in the existing scenarios.

Potential questions to ask are:

- Are there management alternatives that would be more successful in the existing scenarios than others? Re-look at the Step 6 slide on “placing bets” (see slide 30)
  - Do any management alternatives represent a robust opportunity?
  - Do any management alternatives represent a “bet the farm” option?
  - Do any management alternatives help us prepare for, or prevent, a worst case scenario?
- Do any of the management alternatives limit or increase future management adaptability?
- Do any of the management alternatives limit or increase the adaptability of the fishermen, fishing businesses, or fishing communities?



“Scenarios are stories. They are works of art rather than scientific analyses. The precision of [their content] is less important than the types of conversations and decisions they spark.”

Arie de Geus,
The Living Company

De Geus is a former corporate planning director for Royal Dutch Shell. Shell pioneered the application of scenario planning to the business world.

For more information on the ECSP project, or for more resources on scenario planning, please visit https://www.mafmc.org/climate-change-scenario-planning

Links to Additional Toolkit Materials

1. Designed worksheets (scenario creation, idea generation)
2. Timed agendas for scenario discussions (various durations)
3. Guidelines for scenario small group facilitators
4. Language for scenario ground rules and session expectations
5. Description of alternative scenario creation approaches
6. Suggestions for ongoing ‘monitoring’ conversations