Scenarios and Discussion Guide

The Climate Scenarios Workshop will explore four hypothetical scenarios with the following attributes:

Scenario 1: Current trajectory
Some progress toward ecosystem-based fisheries management (EBFM), significant climate change impacts, and moderate predictive capabilities

Scenario 2: Best of both worlds
Highly effective and inclusive ecosystem-based management (EBM), lowest potential climate change impacts, and strong predictive capabilities

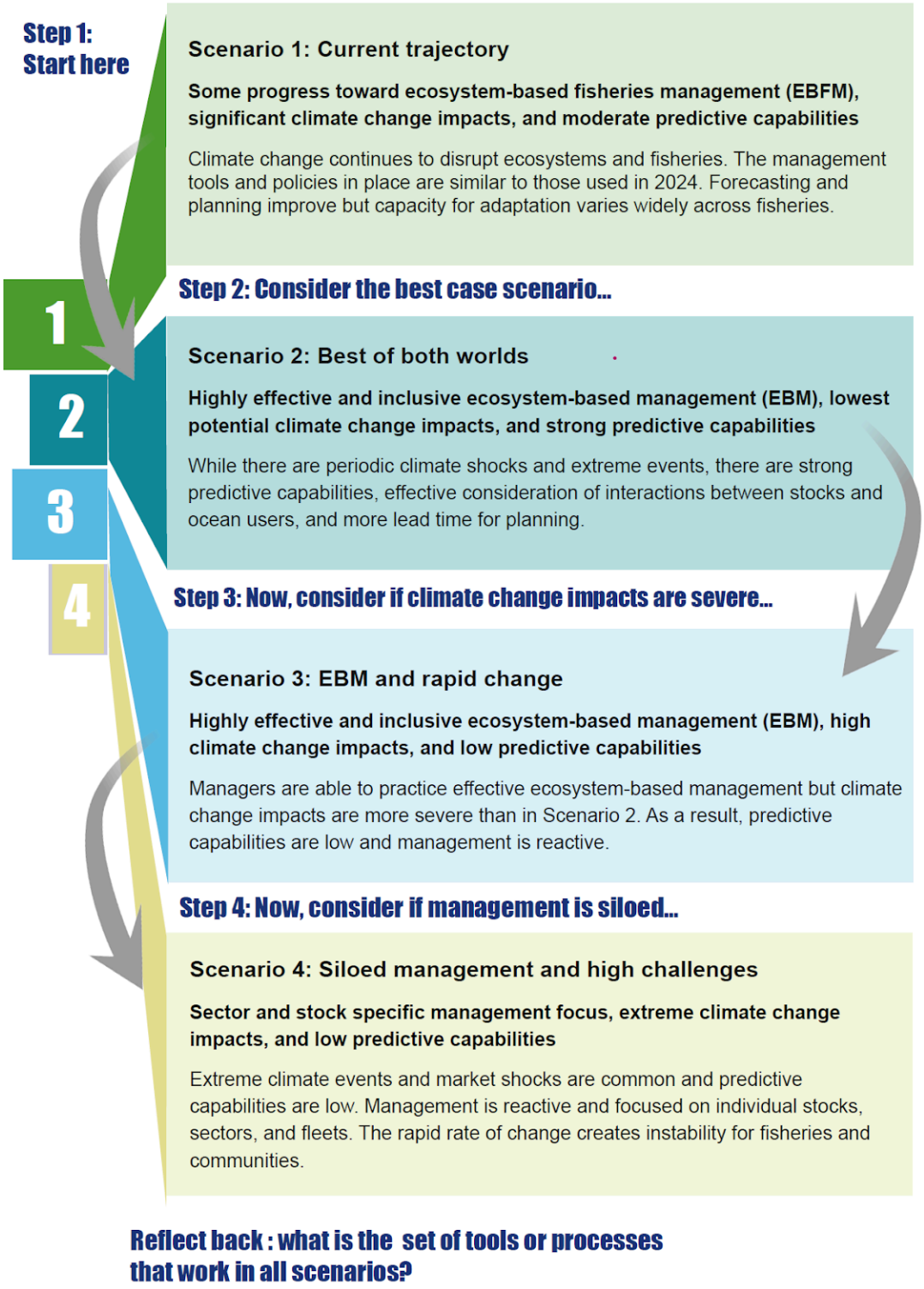
Scenario 3: EBM and rapid change
Highly effective and inclusive ecosystem-based management (EBM), high climate change impacts, and low predictive capabilities

Scenario 4: Siloed management and high challenges
Sector and stock specific management focus, extreme climate change impacts, and low predictive capabilities

The following questions will be used to help guide the discussion of all four scenarios. From your perspective:

1. What does climate resilience look like in each scenario?
2. What are the challenges to climate resilience?
3. What management tools and approaches could help?
4. What scientific tools and information could help?
5. What other assets and opportunities could help support climate resilience? (E.g., diverse knowledge sources, collaborative approaches, community and industry-led initiatives).
6. How can the Council support a robust and inclusive process for climate readiness planning?

Discussion Roadmap



Scenario 1: Current trajectory

Some progress toward ecosystem-based fisheries management (EBFM), significant climate change impacts, and moderate predictive capabilities

Scenario snapshot

Climate change continues to disrupt fisheries and marine ecosystems. **Climate shocks** and **extreme events** are much more frequent than in 2024. **Predictive capabilities** are improving, though primarily for data-rich stocks. For other stocks, the degree of change and uncertainty is outpacing, and thus decreasing, the ability to predict and plan for change.

The management tools and policies in place in this future, such as the use of area and seasonal closures, are similar to those used in 2024. Compared to the present day there has been some progress toward **ecosystem-based fisheries management** practices, such as exploring multi-species considerations in some stock assessments. Adaptive capacity varies widely across fisheries.

What else is happening?

Global trends
The global population continues to grow, driving a proportional demand for seafood. Global seafood markets are increasingly disrupted by climate shocks.

Climate
Climate change and extreme events continue to disrupt ecosystems, livelihoods, and human well-being. Species distribution and catchability are highly variable from year to year. Winter sea ice and a summer cold pool in the Bering Sea are now rare, occurring about twice per decade, and restricted to the northernmost areas of the Northern Bering Sea. There are periodic recruitment failures about every 5 years, similar to what happened with Pacific Cod in the Gulf of Alaska following the 2014-2016 marine heat wave.

Management
The management tools and policies used in this future are similar to those used in 2024. Area and seasonal closures are stock-specific and determined in the same way as present day. Managers are able to practice some ecosystem-based fisheries management by accounting for interactions and ecosystem effects across single-species targets. Management continues to meet most sustainability targets, but there is an increasing risk that climate-induced depletion makes it difficult to rebuild stocks to sustainable levels by managing fishing mortality.

Technology and information
Forecasting skills improve and there is investment in planning tools, but there is high uncertainty about climate futures.

Fisheries and fishing communities

Uncertainty creates unpredictable impacts on harvesters, processors, and communities. Some fisheries continue to face bycatch avoidance and marketability challenges. The ability of fisheries, fleets, and communities to adapt to change varies by scale and geography (for example, across small and large vessels, and shore-based and off-shore based processors).

Scenario 2: Best of both worlds

Highly effective and inclusive ecosystem-based management (EBM), lowest potential climate change impacts, and strong predictive capabilities

Scenario snapshot

Alaska fisheries are experiencing periodic **climate shocks** and **extreme events** with slightly more frequency than in 2024. Although fisheries and communities are facing **greater uncertainty,** there are stronger predictive capabilities, more **lead time** to develop adaptation strategies, and improved planning for **emergency response** to support timely disaster relief and lessen the impacts of climate shocks.

Managers are now able to fully practice **ecosystem-based management** (EBM). The environment is changing quickly but managers can effectively consider **interactions between species** and **spatial interactions** between fishing and other ocean uses.

What else is happening?

Global trends

Global economic growth is less energy and resource intensive, and places a higher value on human and ecosystem well-being. The global demand for seafood is high as preferences shift away from terrestrial meat consumption. Global seafood markets are more stable than in 2024 due to increased intergovernmental coordination and lower geopolitical tensions.

Climate

Global temperatures have continued to rise since 2024, but by reducing emissions overall and using technology to capture more of the CO2 emitted, the planet has remained below the critical level of warming (+2 deg C) associated with the most catastrophic global climate change impacts. Although this scenario represents the lowest potential climate change impacts, these impacts are still more frequent and severe than in 2024. Alaska is experiencing marine heat waves on average every 7-8 years, about twice as frequently as between 1980-2020. Winter sea ice and a summer cold pool (similar to the duration and extent of 2023) occur in the Bering Sea about 5 of every 10 years.

Management

Managers are able to practice ecosystem-based management that accounts for interactions between species, including between managed stocks such as groundfish and crab, between target stocks and protected species; and between fisheries and other ocean uses (for example, the spatial overlap of fishing with shipping activity). Dynamic management strategies enable rapid response to changes, such as changes in spawning times and critical bycatch or protected species risk periods. Management is effective at meeting sustainability targets. Due to EBM

practices, improved predictive capabilities, and the moderate pace of change, managers have more lead time to engage in inclusive planning that balances the interests of user groups.

Technology and information
Given the moderate pace of change, investments in technology and AI provide timely, accurate monitoring and forecasts that enable prediction of changes beforehand. This allows more time for inclusive and participatory planning and decision-making for responses to reduce climate impacts, and for consideration of climate-integrated advice.

Fisheries and fishing communities
Predictive capabilities and a longer planning horizon allow for a focus on long-term productivity and stability over short-term gains. Improvements in technology and information sharing are enabling fisheries to improve their bycatch avoidance practices, reduce discards, and operate efficiently to achieve high quality sustainable yields. Improved coordination and planning horizons enable managers to incorporate community cultural and economic dependencies on marine resources into management responses.

Scenario 3: EBM and rapid change

Highly effective and inclusive ecosystem-based management (EBM), high climate change impacts, and low predictive capabilities

Scenario snapshot

As in scenario 2, managers are able to practice ecosystem-based management with effective **coordination**, **information-sharing**, and the ability to **consider interactions** between stocks/species and across fisheries and other sectors.

However, in contrast to Scenario 2 there are more **extreme climate change impacts**, with drastic impacts to ecosystem function and productivity. Extreme climate events and market shocks are common. **Predictive capabilities** are low and management is constantly in a **reactive** mode. The rapid rate of change contributes to **instability** for fisheries and communities

What else is happening?

Global trends

Global population growth is high. Although the global demand for all food resources is up, global seafood demand is proportionally lower than in 2024. There are significant food and nutrition security issues with disparity globally across communities and countries. Markets are volatile and largely unpredictable due to frequent climate and geopolitical disruptions.

Climate

Alaska is experiencing much warmer conditions than historically observed and marine ecosystems are drastically impacted. The capacity for marine ecosystems to support birds, mammals, fish and shellfish is reduced 40% relative to 2024. Winter sea ice no longer forms in the Eastern Bering Sea and there is rarely a measurable cold pool. Many species have shifted northward and deeper to cooler waters. While sea ice still forms in the central Arctic in the winter, the region is ice-free nearshore and shipping traffic is common. Large marine heat waves occur nearly every year (about 8 out of 10). Ocean acidification increases to levels known to impact crab larval survival.

Management

As in Scenario 2 there is strong interest in ecosystem-based management and high coordination across sectors. However, the high degree of change reduces the ability to predict future conditions, resulting in less time for planning and tradeoff evaluations ahead of time. Decisions need to be made rapidly to adjust for unforeseen shocks and shifts in species, markets, and climate conditions. Area and seasonal closures are static rather than dynamic, but determined based on multi-stock and cross-sector considerations.

Technology and information
Because there is higher uncertainty in the system, there are fewer tools that provide skillful predictions forecasts of markets, ecosystems, and climate. There is a focus on rapid response and technology that supports rapid communication and coordination. Coordination across sectors is high. Information from real time monitoring, high observer coverage, and on-the-water observations is publically and readily available.

Fisheries and fishing communities
Climate and market shocks contribute to instability. Although there is limited time for advance planning and tradeoff analysis, there are effective rapid-response capabilities. There is an emphasis on long-term stability over near-term yield.

Scenario 4: Siloed management and high challenges

Sector and stock specific management focus, extreme climate change impacts, and low predictive capabilities

Scenario snapshot

A high degree of warming has dramatically altered the **structure** and **productivity** of Alaska's marine ecosystems. **Extreme climate events** and **market shocks** are common. Predictive capabilities are very limited, and with **limited advance warning** management is in a **reactive** mode.

Management is focused on **near-term management** of **individual stocks, sectors and fleets**. Ecological information is included in assessments and advice (an ecosystem approach to fisheries management, or EAFM) but there is little ability to account for impacts on other managed stocks and species. **Coordination** between fisheries management and other ocean users is low. The rapid rate of change creates **instability** for fisheries and communities.

What else is happening?

Global trends

Global population growth is high, but the global demand for seafood is reduced and global seafood markets are more volatile due to increased climate shocks and increased geopolitical disruptions. Global economic development is more resource and energy-intensive. There is an expansion of mineral extraction, shipping, and oil and gas development in Alaska.

Climate

(*Note, this is the same as in Scenario 3.)
Alaska is experiencing much warmer conditions than historically observed and marine ecosystems are drastically impacted. The capacity for marine ecosystems to support birds, mammals, fish and shellfish is reduced 40% relative to 2024. Winter sea ice no longer forms in the Eastern Bering Sea and there is rarely a measurable cold pool. Many species have shifted northward and deeper to cooler waters. While sea ice still forms in the central Arctic in the winter, the region is ice-free nearshore and shipping traffic is common. Large marine heat waves occur nearly every year (about 8 out of 10). Ocean acidification increases to levels known to impact crab larval survival.

Management

In the face of high uncertainty about the future productivity of Alaska fisheries, management is focused on maximizing near term yield. Management is focused on individual stocks, sectors and fleets, with inclusion of ecological information in assessments and advice but little ability to account for impacts on other managed stocks and species. Coordination between fisheries

management and other ocean users is low. Seasonal management measures such as area closures are static and based on single species and stocks.

Technology and information
In a future with more frequent climate shocks and low predictability, most funding and government resources are directed toward response and recovery. As a result, investment in predictive tools has stalled out and available resources are more focused on real-time monitoring. Within some groups developments in communications enable fleets to rapidly share information, for example to improve bycatch avoidance and support efficient targeting.

Fisheries and fishing communities
Frequent shocks and disruptions to fisheries and markets have become the norm. The rapid succession of extreme events creates challenges to recovering and maintaining stocks at sustainable levels. Stocks are shifting rapidly, and new species and stocks are shifting into the Council's jurisdiction. Fishery dependent communities, both shoreside and at-sea sectors, struggle with fluctuating supply and processing capacity and there is increasing uncertainty in employment, revenues, and operating costs.