

Climate Change Task Force Workplan Overview

CCTF Members:

Co-chair: Diana Stram (NPMFC)

Co-chair: Kirstin Holsman (NMFS- AFSC)

Lauren Divine (Aleut Community of Saint Paul Island)

Scott Goodman (Natural Resources Consultants/BS Fisheries Res. Foundation)

Joe Krieger (NMFS-Regional Office)

Mike LeVine (Ocean Conservancy)

Steve Martell (SeaState)

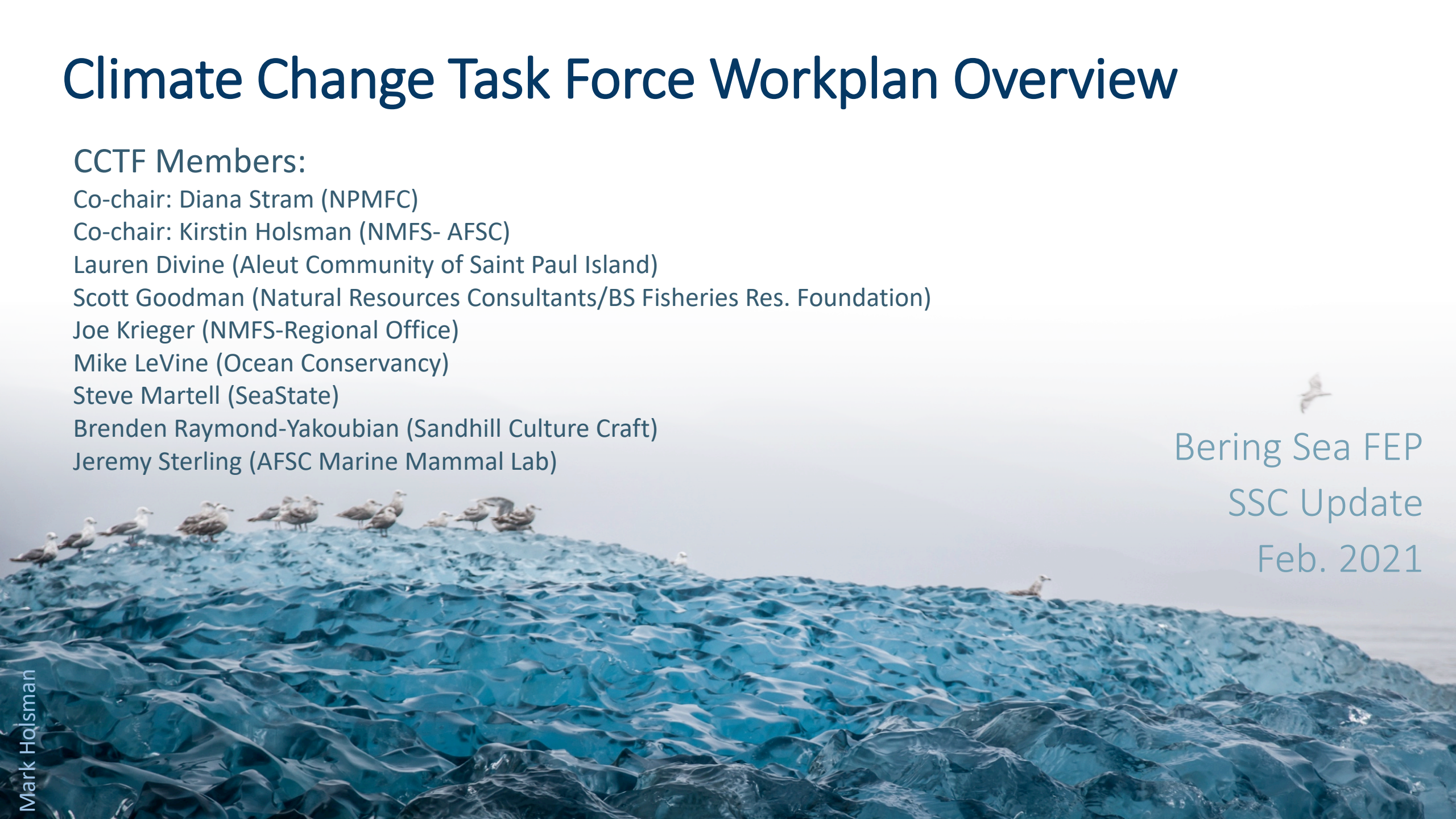
Brenden Raymond-Yakoubian (Sandhill Culture Craft)

Jeremy Sterling (AFSC Marine Mammal Lab)

Bering Sea FEP

SSC Update

Feb. 2021



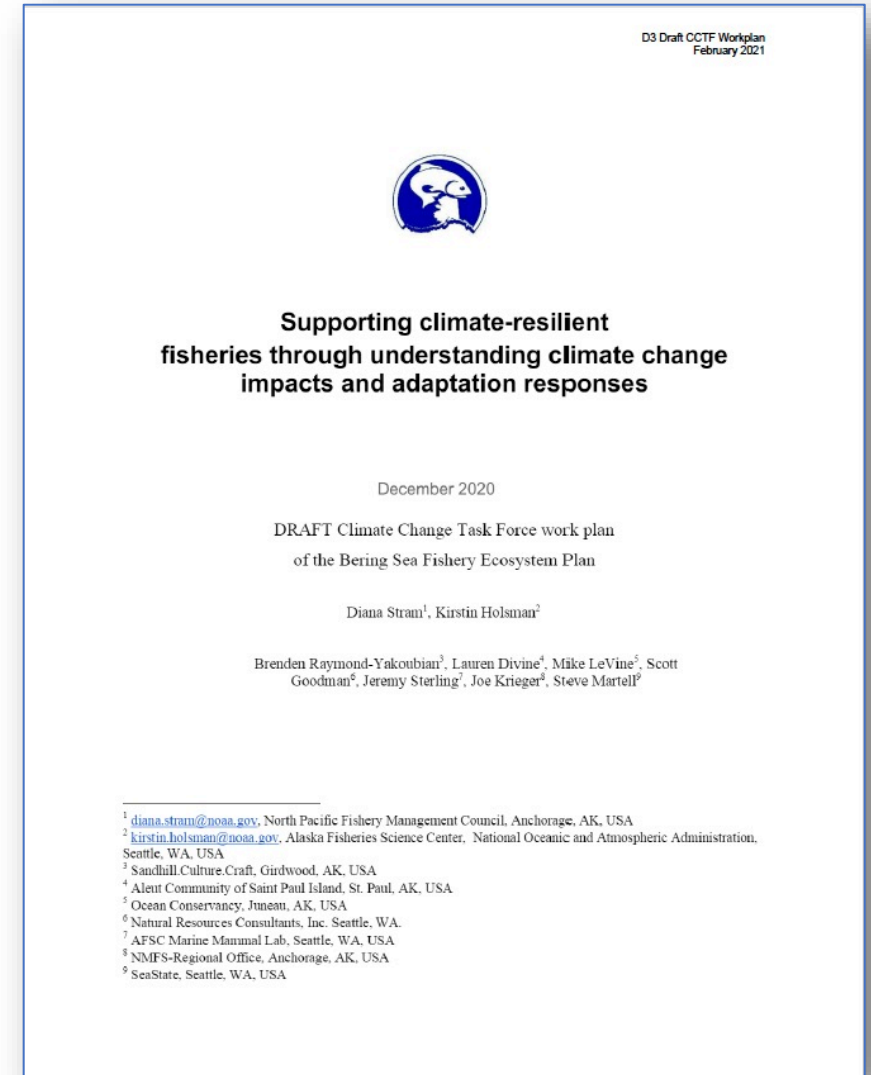
Attendees Dec. 14 & 16, 2020 (virtual)

Taskforce members in attendance:

Lauren Divine (Aleut Community of Saint Paul Island), Scott Goodman (Natural Resources Consultants/Bering Sea Fisheries Research Foundation), Kirstin Holsman co-Chair (AFSC-Seattle), Steve Martell (SeaState), Joe Krieger (NMFS-Regional Office), Brenden Raymond-Yakoubian (Sandhill.Culture.Craft), Mike LeVine (Ocean Conservancy), Jeremy Sterling (AFSC Marine Mammal Lab), Diana Stram co-Chair (NPFMC)

Members of the public and other state and agency staff:

Diana Evans (NPFMC), Sarah Wise (AFSC-Seattle), Kate Haapala (NPFMC), Steve Marx, Melissa Parks, Megan Williams, Mateo Paz Soldan, Erin Shaw, Steve MacLean (NPFMC), Teresa Peterson

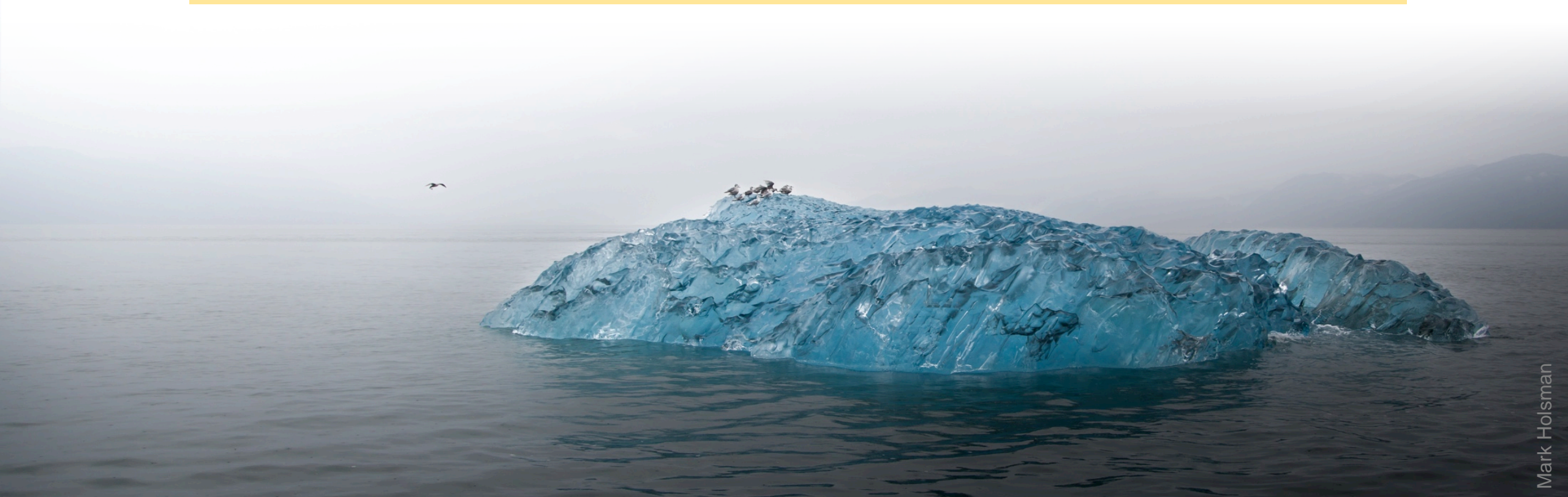


¹ diana.stram@noaa.gov, North Pacific Fishery Management Council, Anchorage, AK, USA
² kirstin.holsman@noaa.gov, Alaska Fisheries Science Center, National Oceanic and Atmospheric Administration, Seattle, WA, USA
³ Sandhill.Culture.Craft, Girdwood, AK, USA
⁴ Aleut Community of Saint Paul Island, St. Paul, AK, USA
⁵ Ocean Conservancy, Juneau, AK, USA
⁶ Natural Resources Consultants, Inc. Seattle, WA, USA
⁷ AFSC Marine Mammal Lab, Seattle, WA, USA
⁸ NMFS-Regional Office, Anchorage, AK, USA
⁹ SeaState, Seattle, WA, USA

The goal of the Climate Change Module is to facilitate the Council's work towards climate-ready fisheries management that helps ensure both short- and long-term resilience for the Bering Sea.



Key: Action Informing NOT policy prescriptive



Key: Seeks to use existing “on ramps” to deliver climate information to Council process



Key: Iterative process that will be refined over time with input and feedback



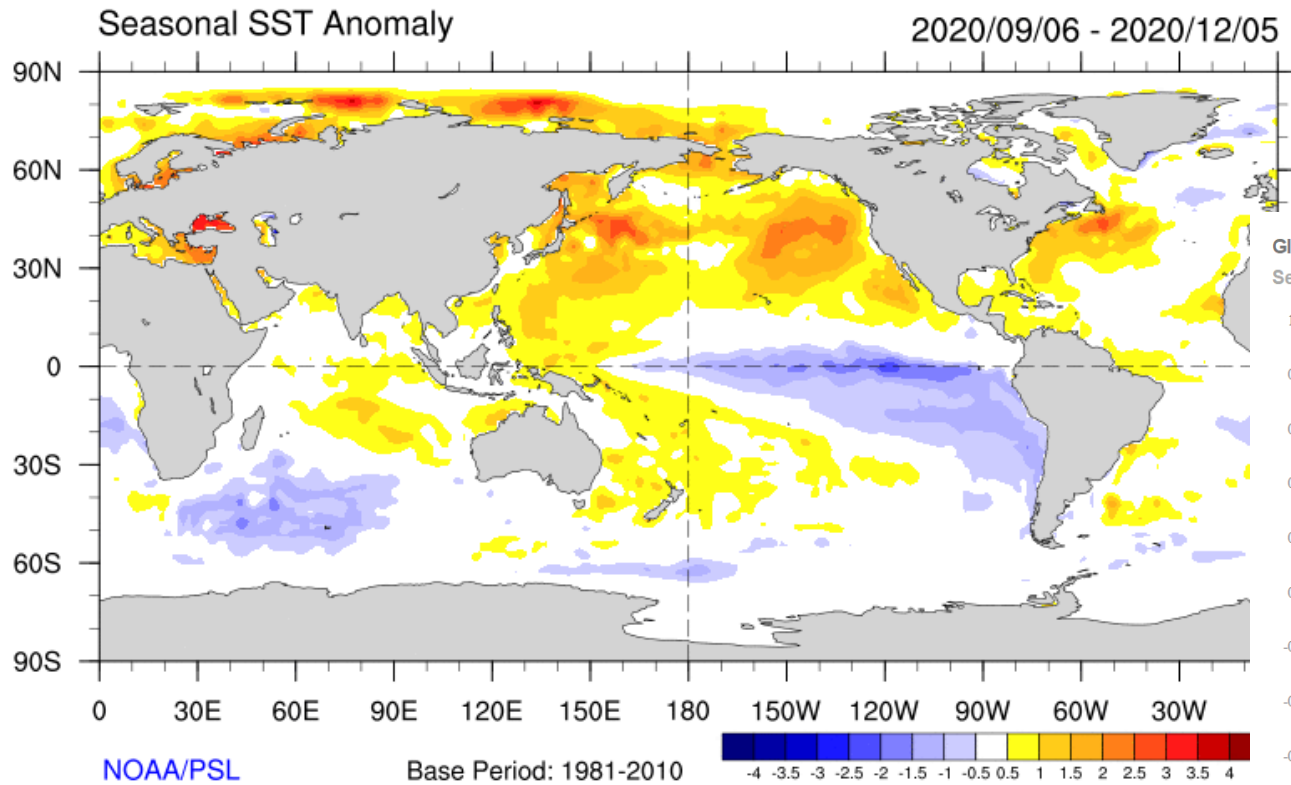
Key: Inclusive approach to provide Council process with “the best available” information on climate impacts and effective adaptation actions to reduce impacts.



BACKGROUND

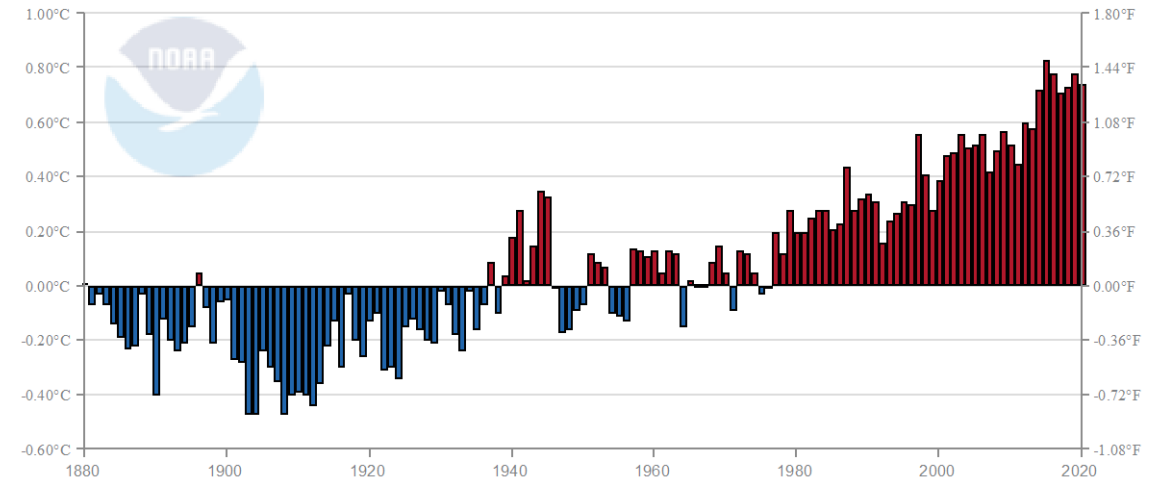


Background: Climate change is altering the Bering Sea ecosystem



<https://psl.noaa.gov/map/clim/sst.shtml>

Global Ocean Anomaly from 1961-1990 climatology 1 degree, weekly resolution
September Temperature Anomalies

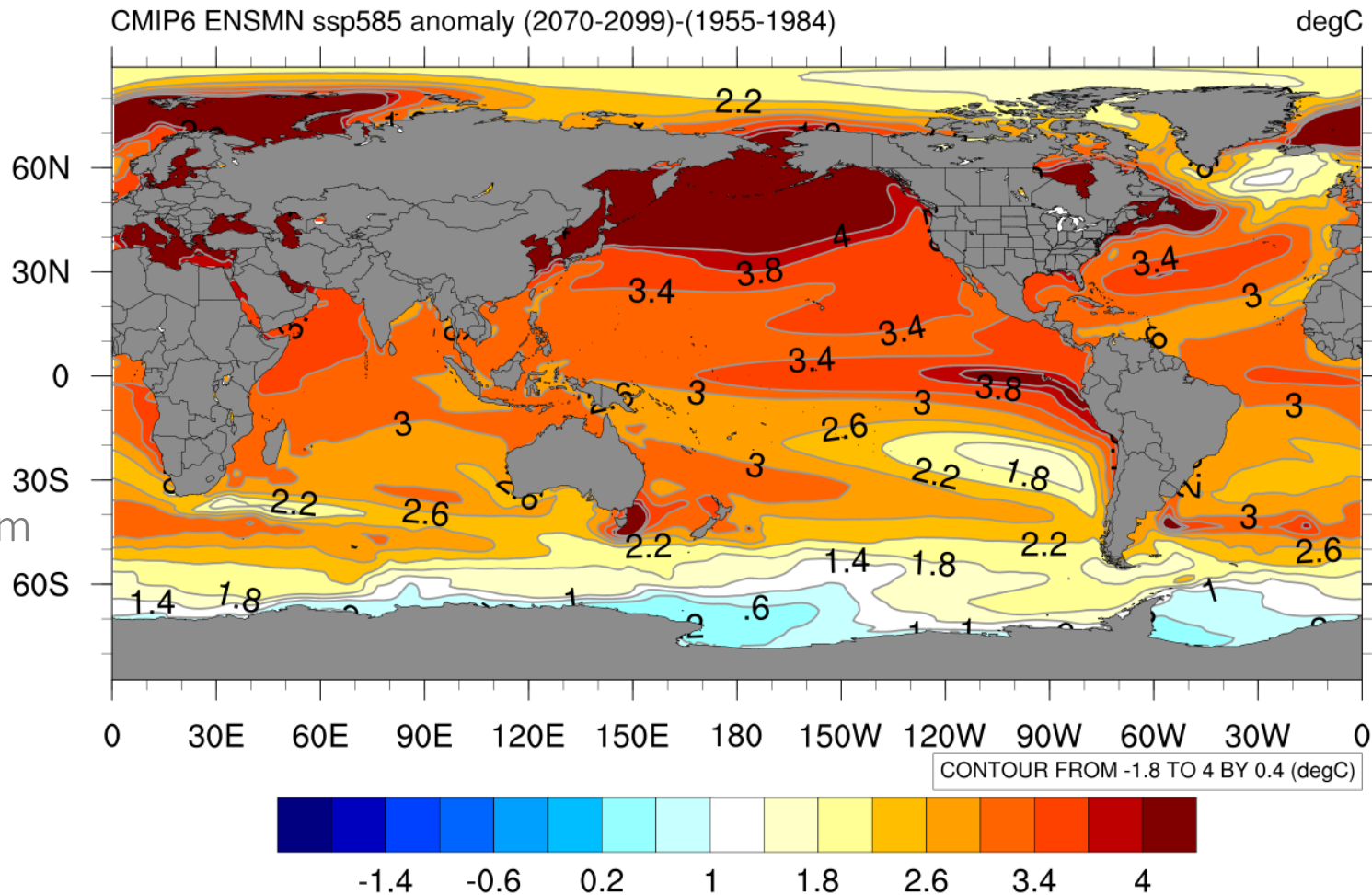


NOAA National Centers for Environmental information, Climate at a Glance: Global Time Series, published November 2020, retrieved on December 9, 2020 from <https://www.ncdc.noaa.gov/cag/>

Background: Future changes to the Bering sea are expected

Changes in Sea Surface Temperature

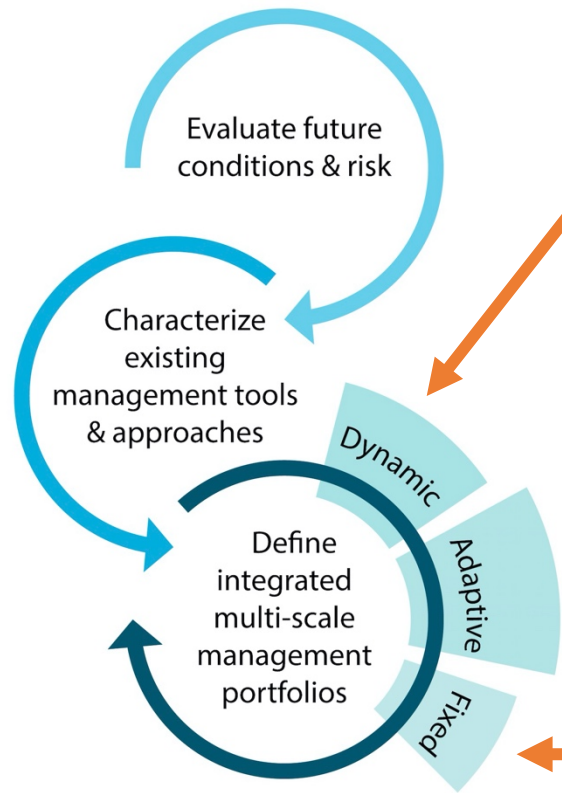
CMIP6: SST Anomaly from 1955-1984 climatology



<https://psl.noaa.gov/ipcc/cmip6/>

Background: Management can reduce impacts & support adaptation

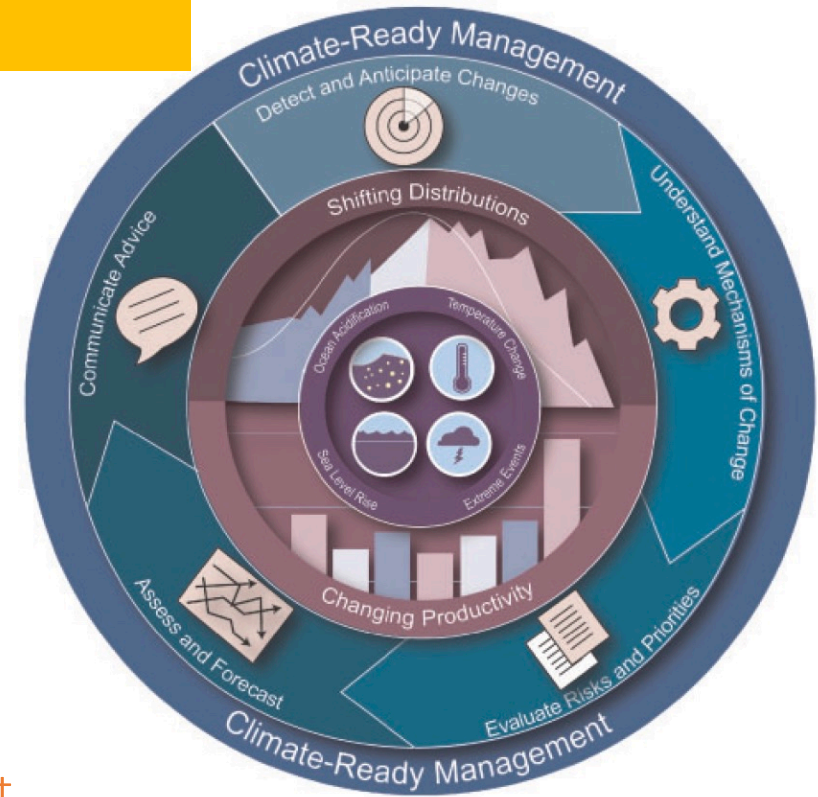
✓ Build climate-informed process



nowcast/ forecast maps of by-catch risk or fish distributions

Next gen. climate-enhanced stock assessments

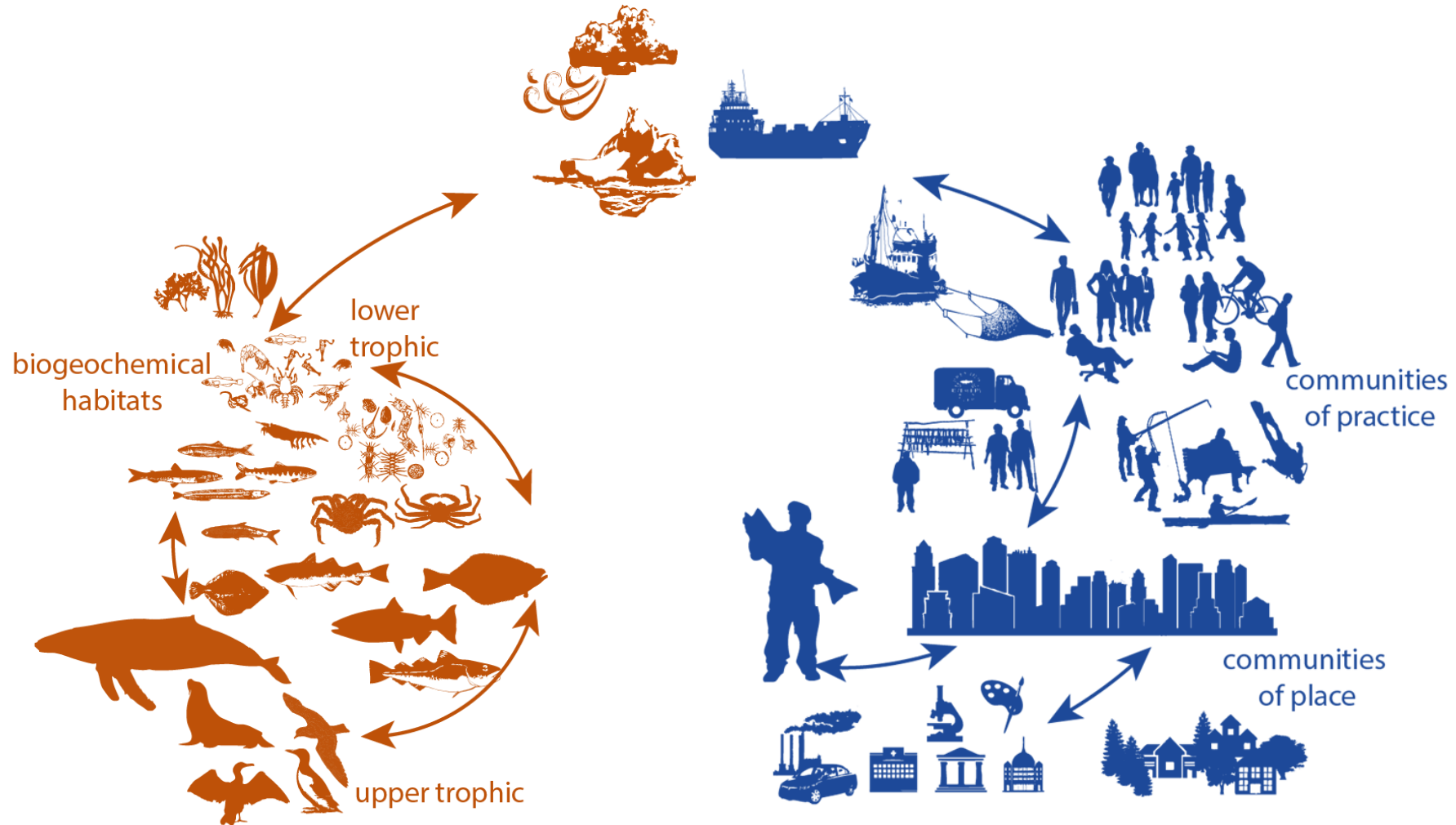
Climate informed Spatial management



Holsman et al.(2019). Towards climate resiliency in fisheries management. ICES Journal of Marine Science. <https://doi.org/10.1093/icesjms/fsz031>

Karp et al. 2019. Accounting for Shifting Distributions and Changing Productivity in the Development of Scientific Advice for Fishery Management. ICES JMS doi: 10.1093/icesjms/fsz048

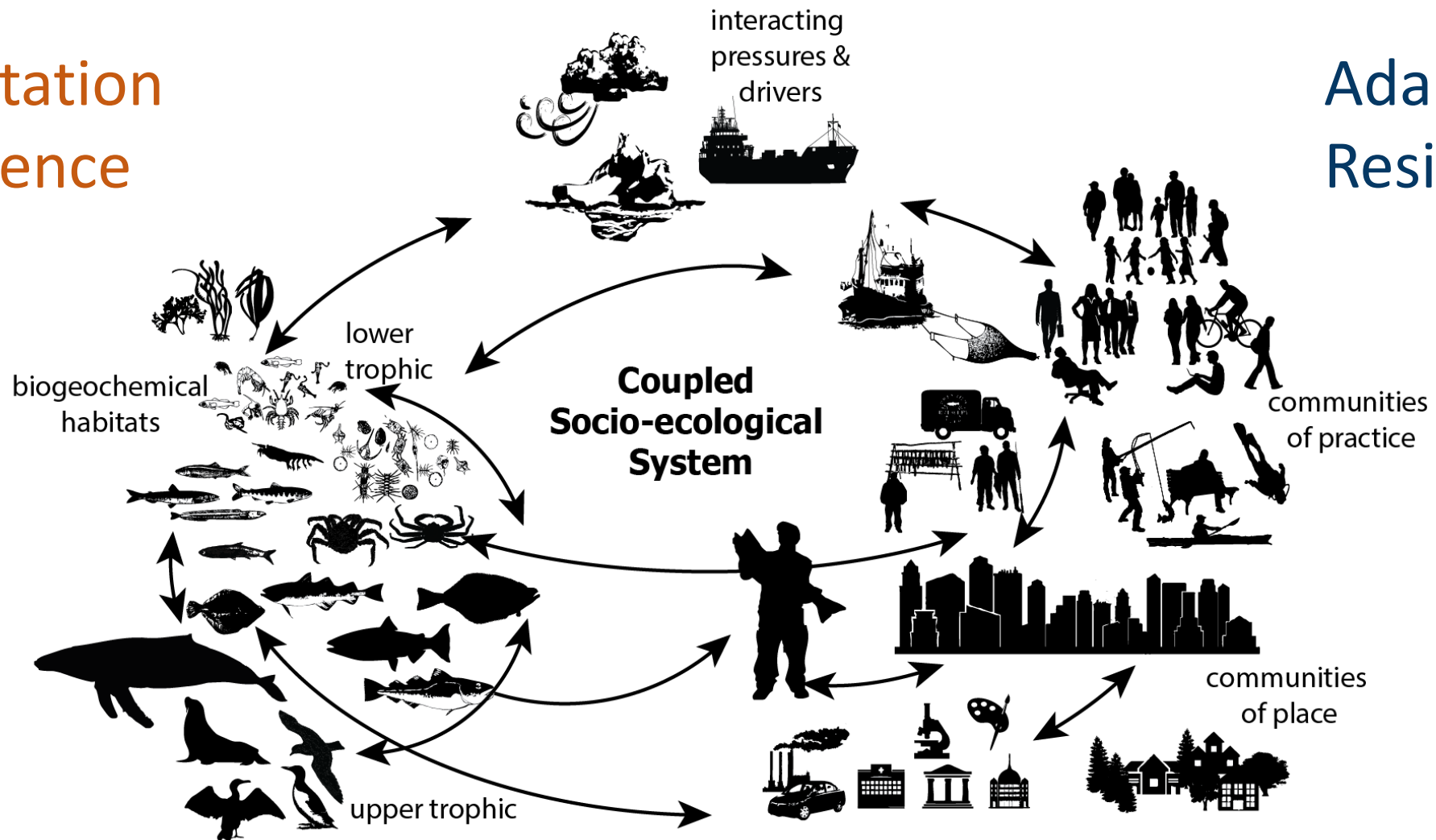
Glossary of Terms: Social-ecological system



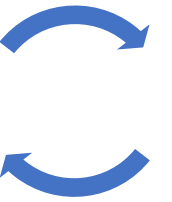
Glossary of Terms: Social-ecological system

Human and ecological systems are linked through feedback mechanisms

Adaptation
Resilience



Adaptation
Resilience



E.g. Fishery Climate Adaptation Tools

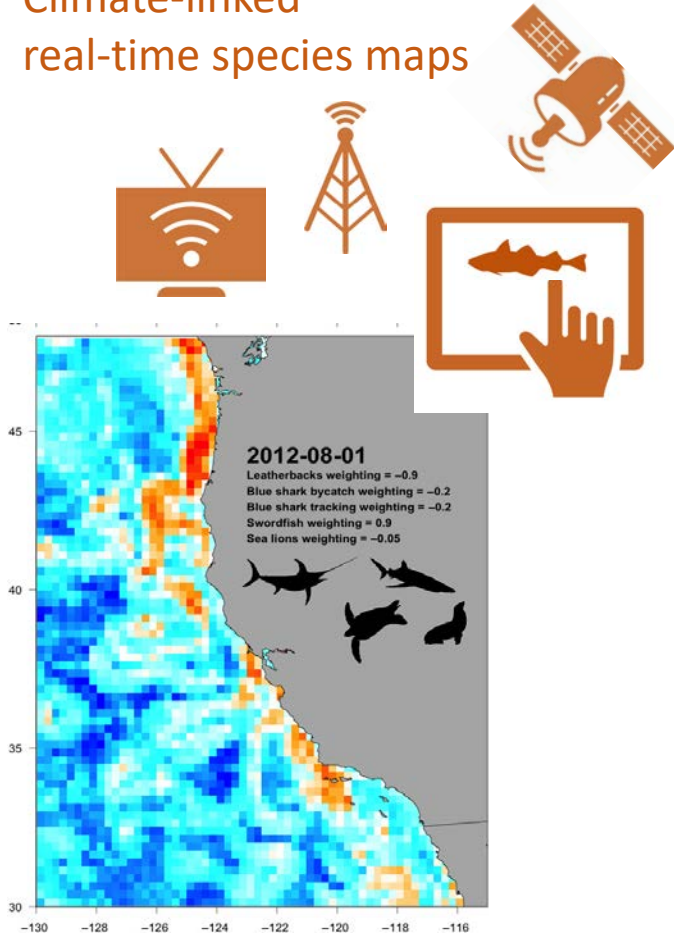


*Adapt in real-time
(incremental adaptation)*

*Minimize impacts through holistic planning
(transformational adaptation)*

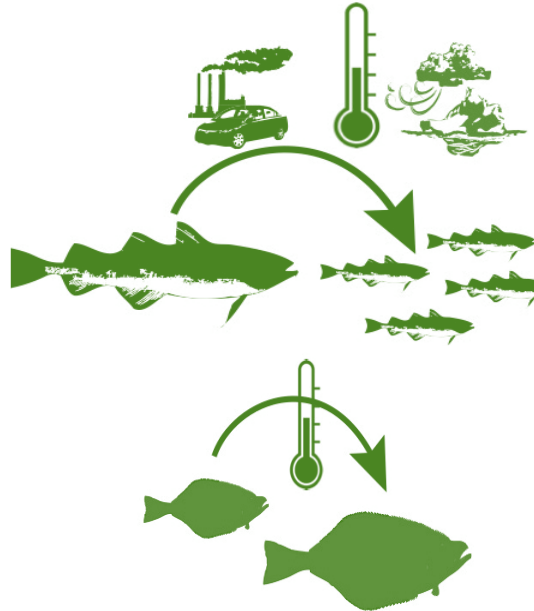


Climate-linked
real-time species maps



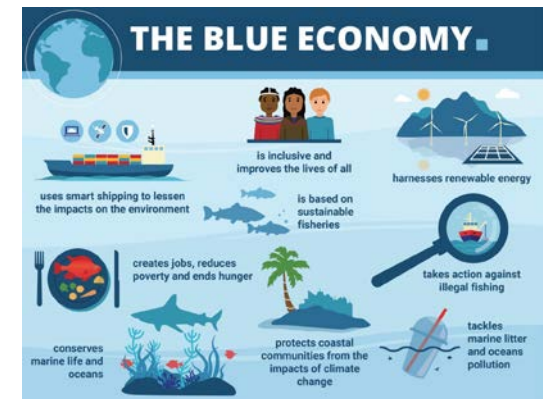
Hazen et al. 2019
<https://advances.sciencemag.org/content/4/5/eaar3001>

Climate-enhanced stock
Assessment models



Holsman et al. 2020
<https://www.nature.com/articles/s41467-020-18300-3>

Climate smart
long-term strategies



www.blueeconomyconference.go.ke

Santos et al. 2020.
<https://www.nature.com/articles/s41893-020-0513-x>

Technical workplan



What: Task Force Goals:

The CCTF aims to **operationalize the delivery of climate change information to the Council** including climate change information, tools, and recommendations that can help the Council **further its ecosystem vision statement through equitable climate change adaptation pathways, transparent communication, utilization of diverse knowledge sources, and broad engagement**. This module will support the Council's capacity to:

- 1. More effectively incorporate climate change information** from diverse knowledge holders into the fishery management process through transparent, effective and dynamic communication and engagement with communities, fishers, managers, scientists and other Council stakeholders with the Council and Council staff; and,
- 2. Evaluate and implement management measures that can:** help preserve livelihoods, economies, health and well-being across fisheries and dependent coastal communities; support near- and long-term adaptation to climate change; and ensure the continued productivity and sustainability of the coupled social-ecological Bering Sea system.

D3 Draft CCTF Workplan
February 2021



Supporting climate-resilient fisheries through understanding climate change impacts and adaptation responses

December 2020

DRAFT Climate Change Task Force work plan
of the Bering Sea Fishery Ecosystem Plan

Diana Stram¹, Kirstin Holsman²

Brenden Raymond-Yakoubian³, Lauren Divine⁴, Mike LeVine⁵, Scott
Goodman⁶, Jeremy Sterling⁷, Joe Krieger⁸, Steve Martell⁹

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⁹ SeaState, Seattle, WA, USA

How: Iterative process of review & synthesis

Collate Info



Synthesize



Communicate

- Objective 1: Coordinate the review of existing and emergent climate information on impacts, adaptation, and residual risk.
- Objective 2: Assess key climate change impacts, adaptation actions, and residual risk.
- Objective 3: Summarize and communicate potential risks and adaptation actions.

How: Iterative process of review & synthesis

Collate Info



Synthesize



Communicate

Step 1:

- ~~Objective 1:~~ Coordinate the review of existing and emergent climate information on impacts, adaptation, and residual risk.

Step 2:

- ~~Objective 2:~~ Assess key climate change impacts, adaptation actions, and residual risk.

Step 3:

- ~~Objective 3:~~ Summarize and communicate potential risks and adaptation actions.

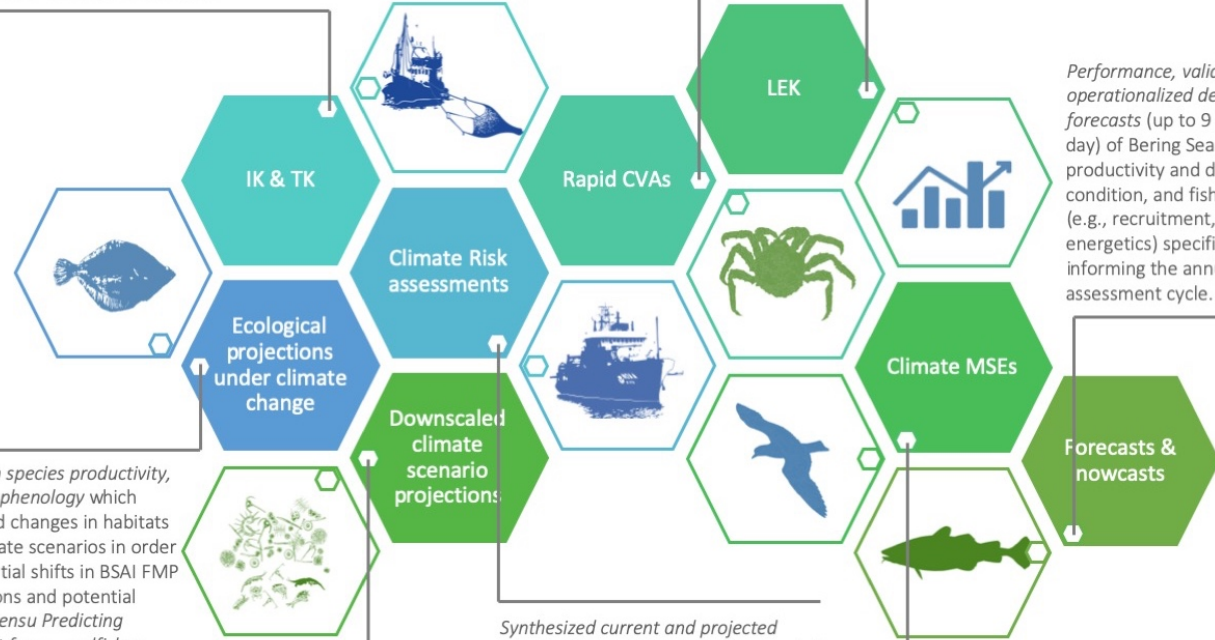
Examples of sources of climate information (Fig. 5)



Indigenous and traditional knowledge of environmental change, climate impacts, adaptation responses, and risks, including direct and cascading impacts of change and response on social and ecological processes and connections.

Rapid Climate Vulnerability Assessments, which use expert knowledge to identify species and communities vulnerable to climate change and prioritize research needs.

Local knowledge, experiences, and testimonials of climate change impacts and adaptation measures.



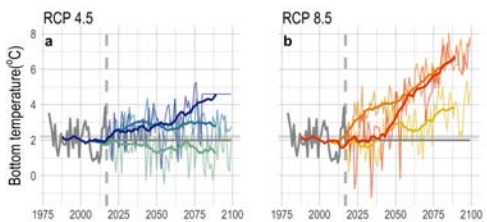
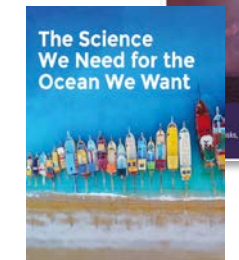
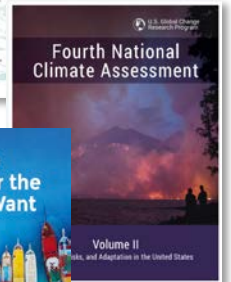
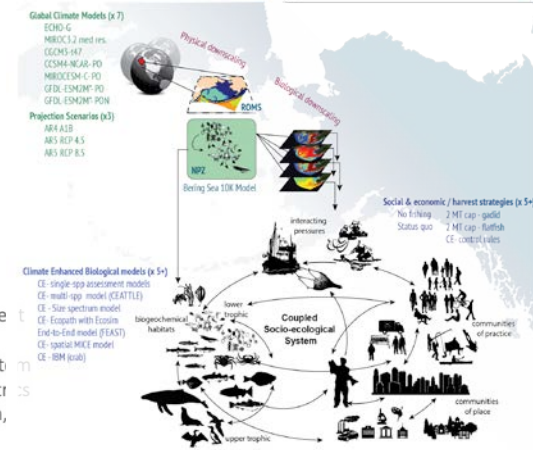
Project changes in species productivity, distributions, and phenology which includes projected changes in habitats under future climate scenarios in order to estimate potential shifts in BSAI FMP species distributions and potential fishing grounds (sensu Predicting changes in habitat for groundfishes under future climate scenarios using spatial distribution modeling).

Synthesized current and projected climate change impacts on the coupled social-ecological Bering Sea system such as Ecosystem Status reports, regional chapters of the National Climate Assessment, polar chapters of IPCC assessments, and other peer-reviewed synthesis reports of climate impacts on Bering sea social and ecological systems.

Management strategy evaluations aimed at testing near- and long-term performance of climate informed management tools under different climate scenarios. Evaluation criteria would include social and economic impacts (or opportunities) to inform tradeoff evaluations.

Performance, validation, and operationalized delivery of weekly forecasts (up to 9 months from present day) of Bering Sea conditions, fish productivity and distribution, ecosystem condition, and fisheries relevant metrics (e.g., recruitment, predation, growth, energetics) specifically aimed at informing the annual groundfish assessment cycle.

Downscaled high resolution projections of oceanographic and lower-trophic level conditions under future climate scenarios of global carbon mitigation (based on the Coupled Model Intercomparison Projects). Downscaling allows for resolution of sea ice and cold-pool dynamics as well as seasonal patterns in productivity.



What: Streamline, summarize, and organize information

Step 1: Collate Info

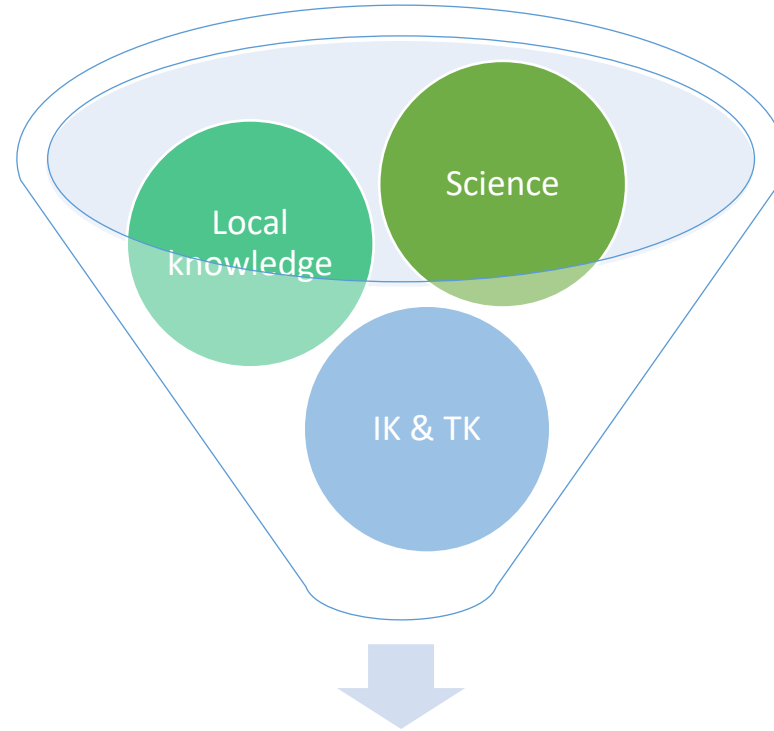


Step 2: Synthesize



Step 3: Communicate

Climate Change Impacts & adaptation information



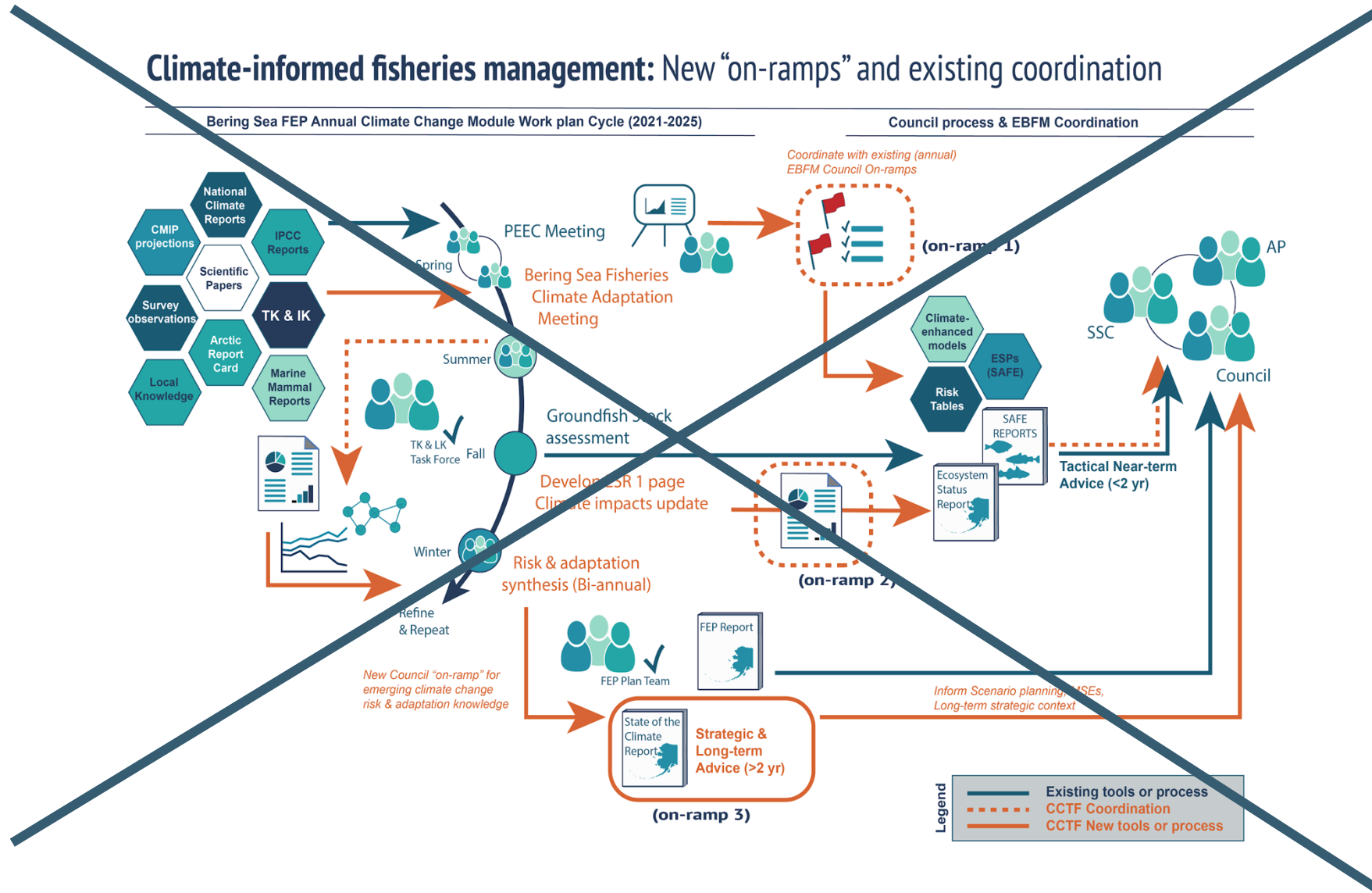
Council Process

On-ramp 1:
Stock assessments

On-ramp 2: Ecosystem
Status Reports

On-ramp 3: FEP Report

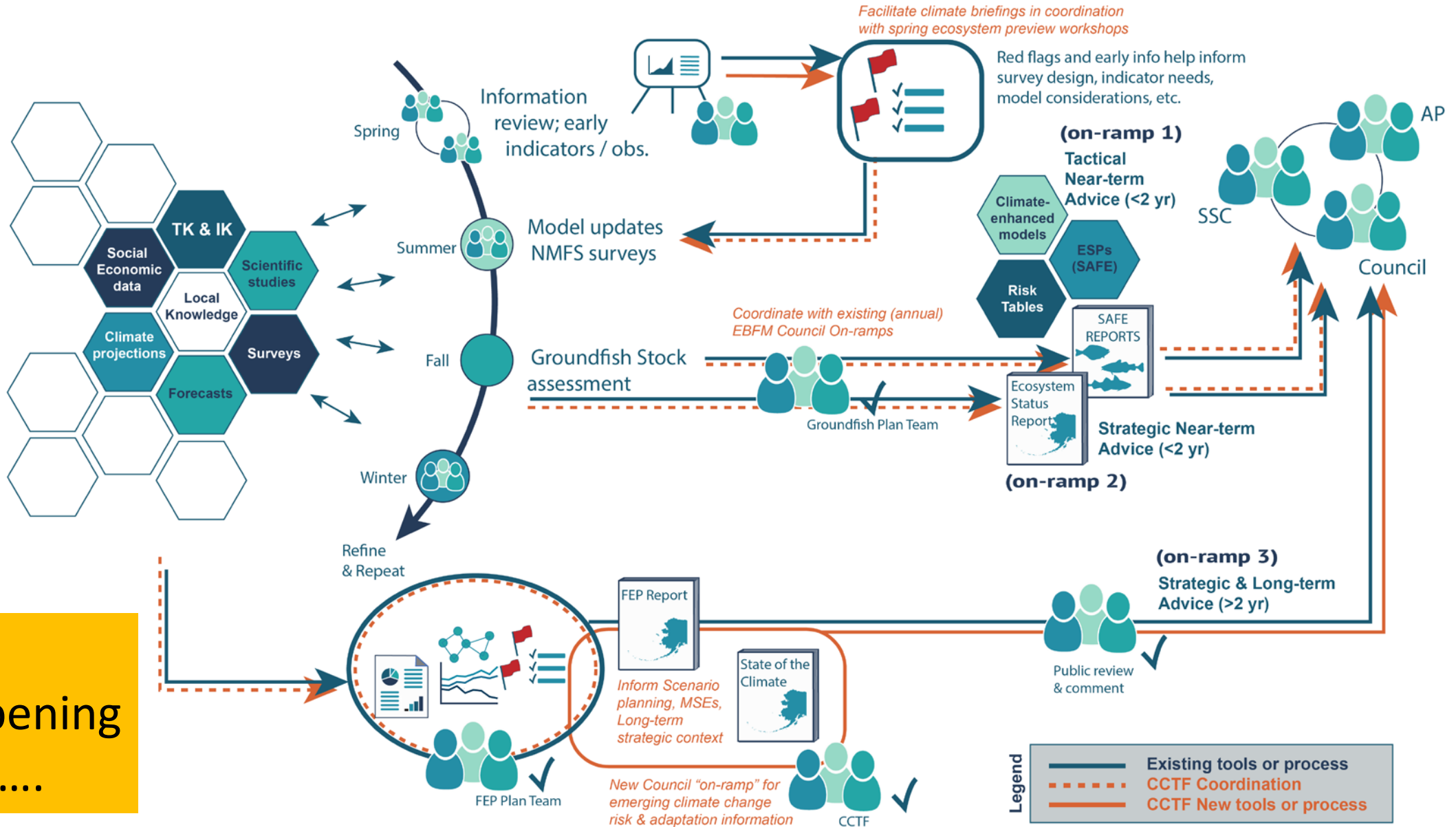
REVISED: Fig. 6 with feedback from Ecosystem Committee



Climate-informed fisheries management: “on-ramps” and existing coordination

Bering Sea FEP Annual Climate Change Module Work plan Cycle (2021-2025)

Council process & EBFM Coordination

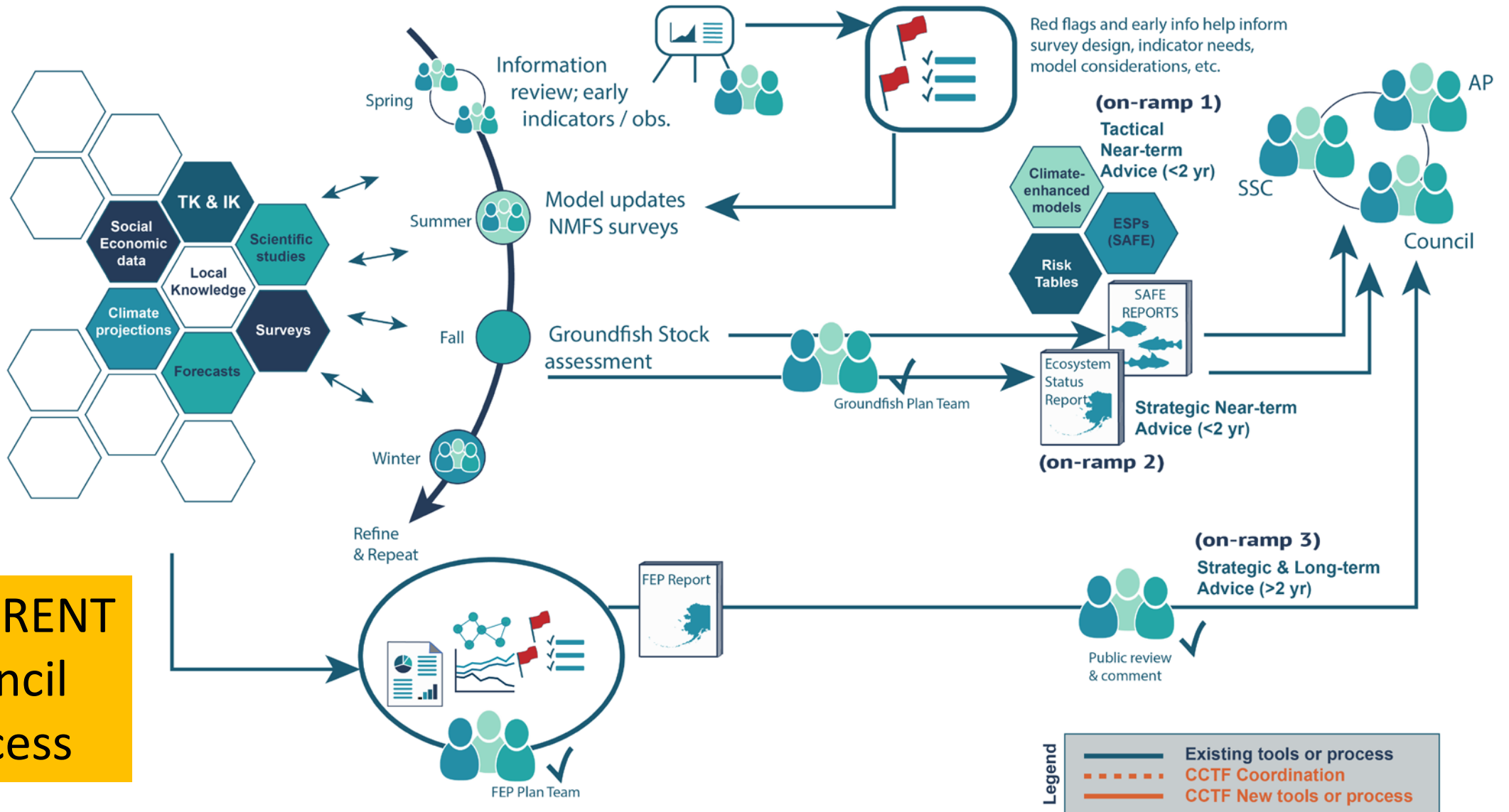


Lots Happening Here....

Climate-informed fisheries management: “on-ramps” and existing coordination

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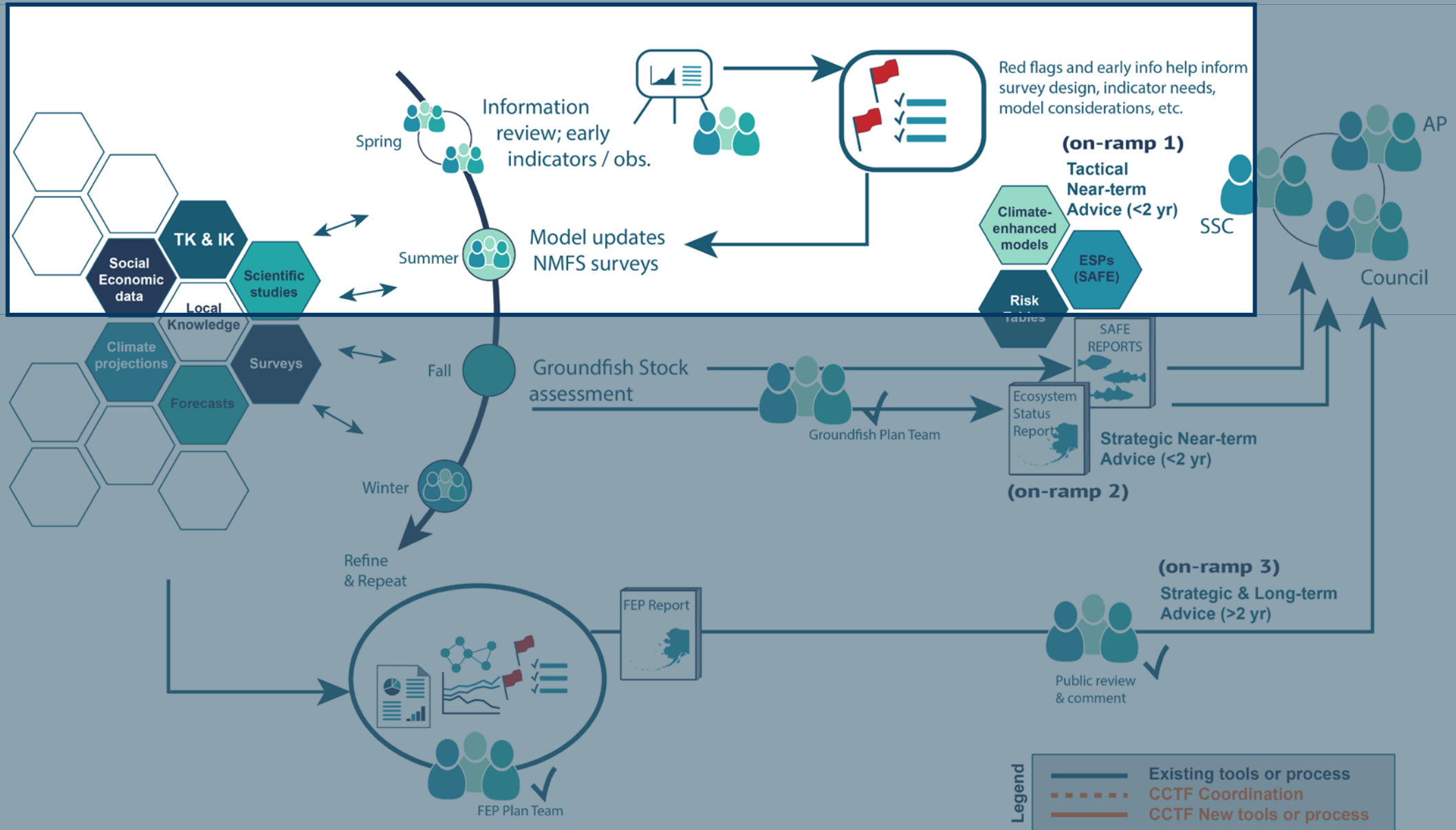


**CURRENT
Council
Process**

Climate-informed fisheries management: “on-ramps” and existing coordination

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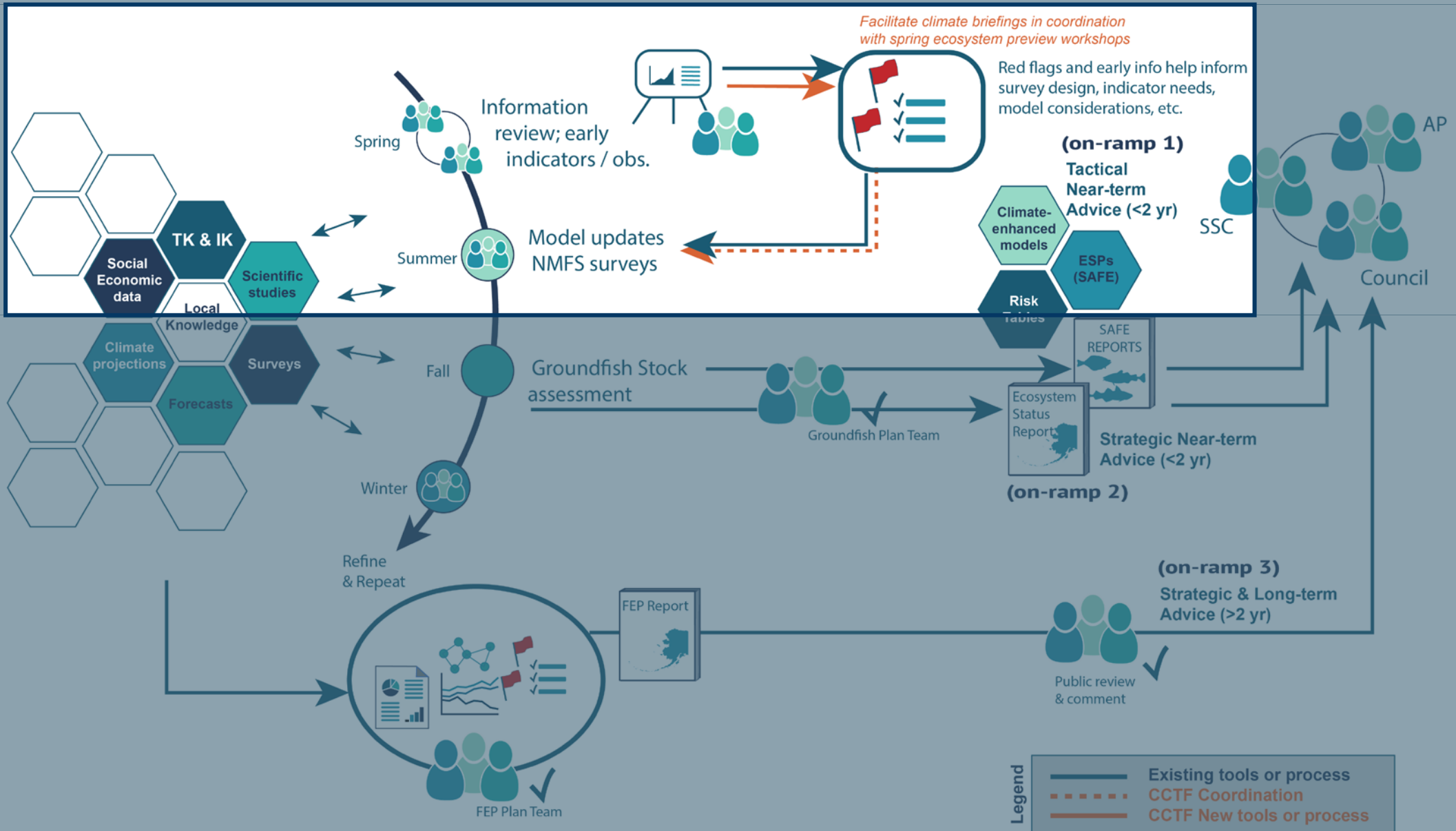
Council process & EBFM Coordination



Climate-informed fisheries management: “on-ramps” and existing coordination

Bering Sea FEP Annual Climate Change Module Work plan Cycle (2021-2025)

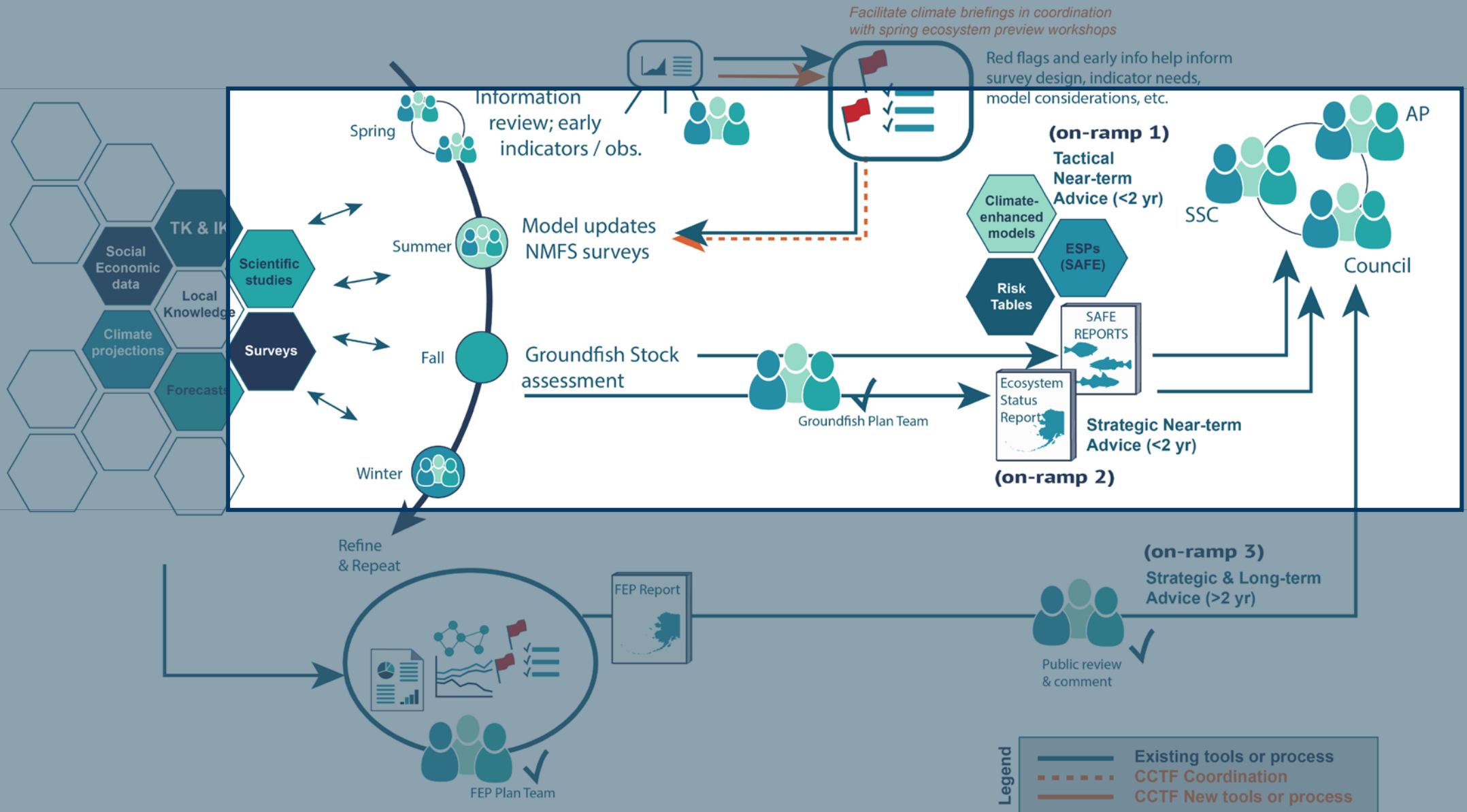
Council process & EBFM Coordination



Climate-informed fisheries management: “on-ramps” and existing coordination

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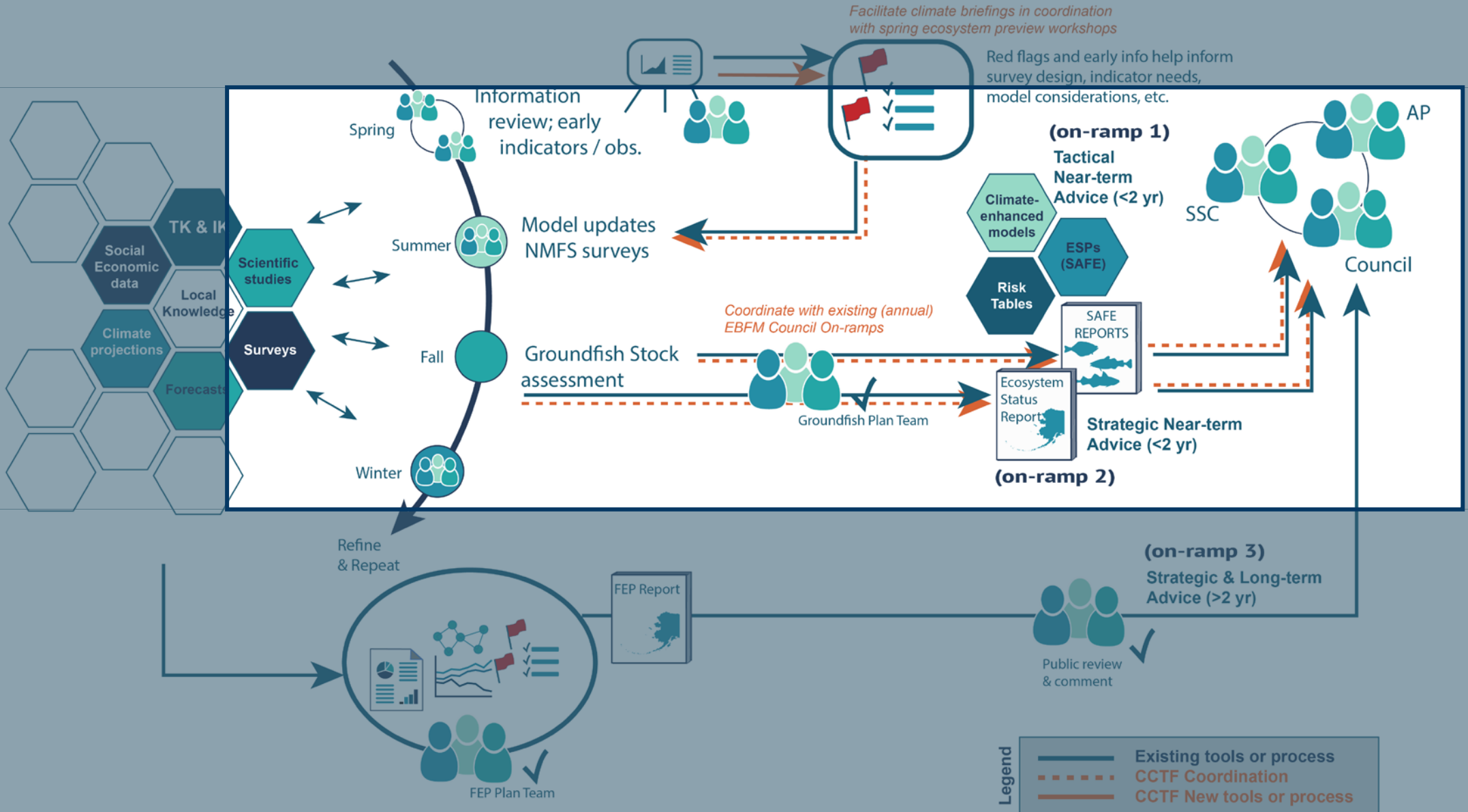
Council process & EBFM Coordination



Climate-informed fisheries management: “on-ramps” and existing coordination

Bering Sea FEP Annual Climate Change Module Work plan Cycle (2021-2025)

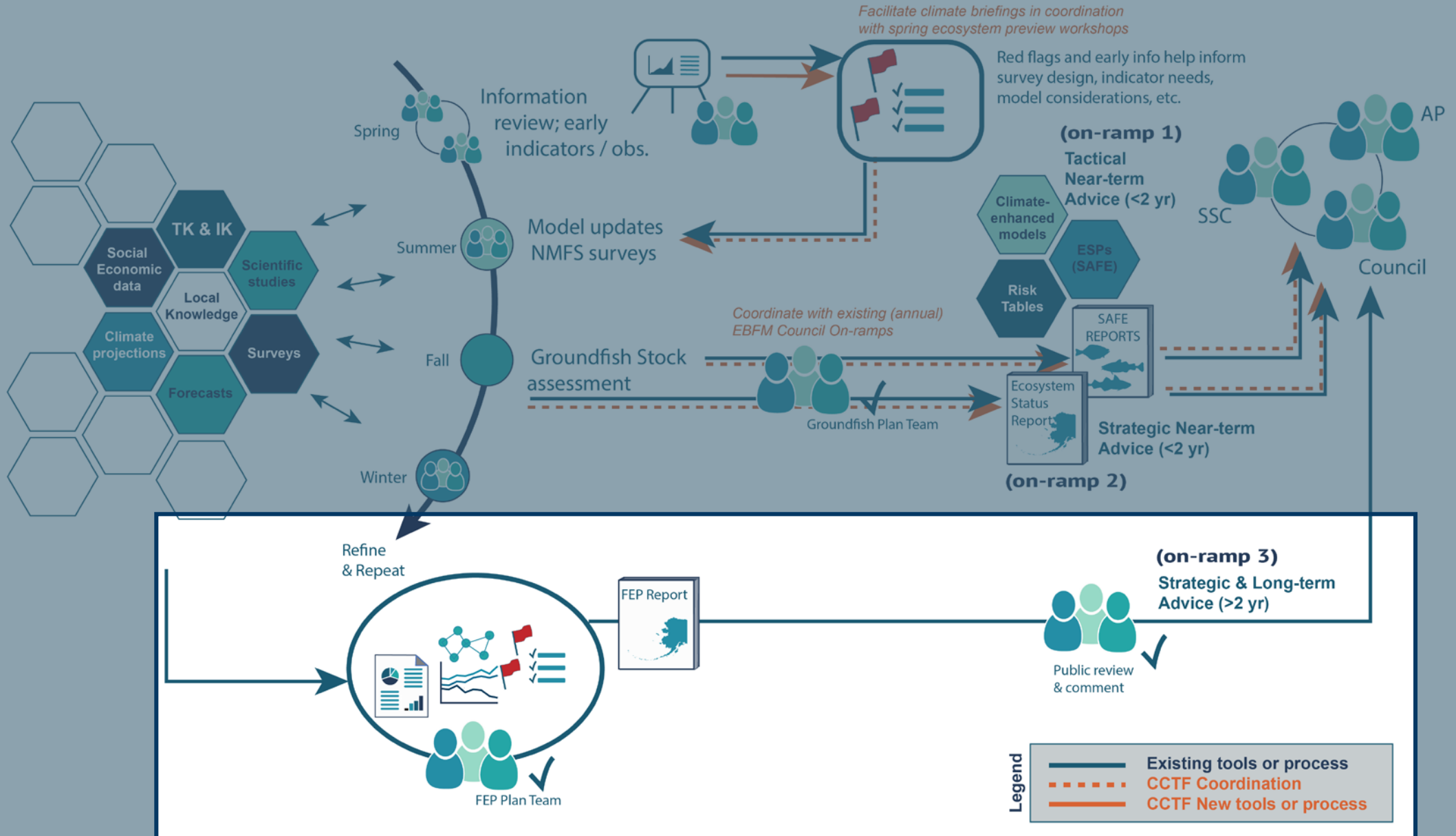
Council process & EBFM Coordination



Climate-informed fisheries management: “on-ramps” and existing coordination

Bering Sea FEP Annual Climate Change Module Work plan Cycle (2021-2025)

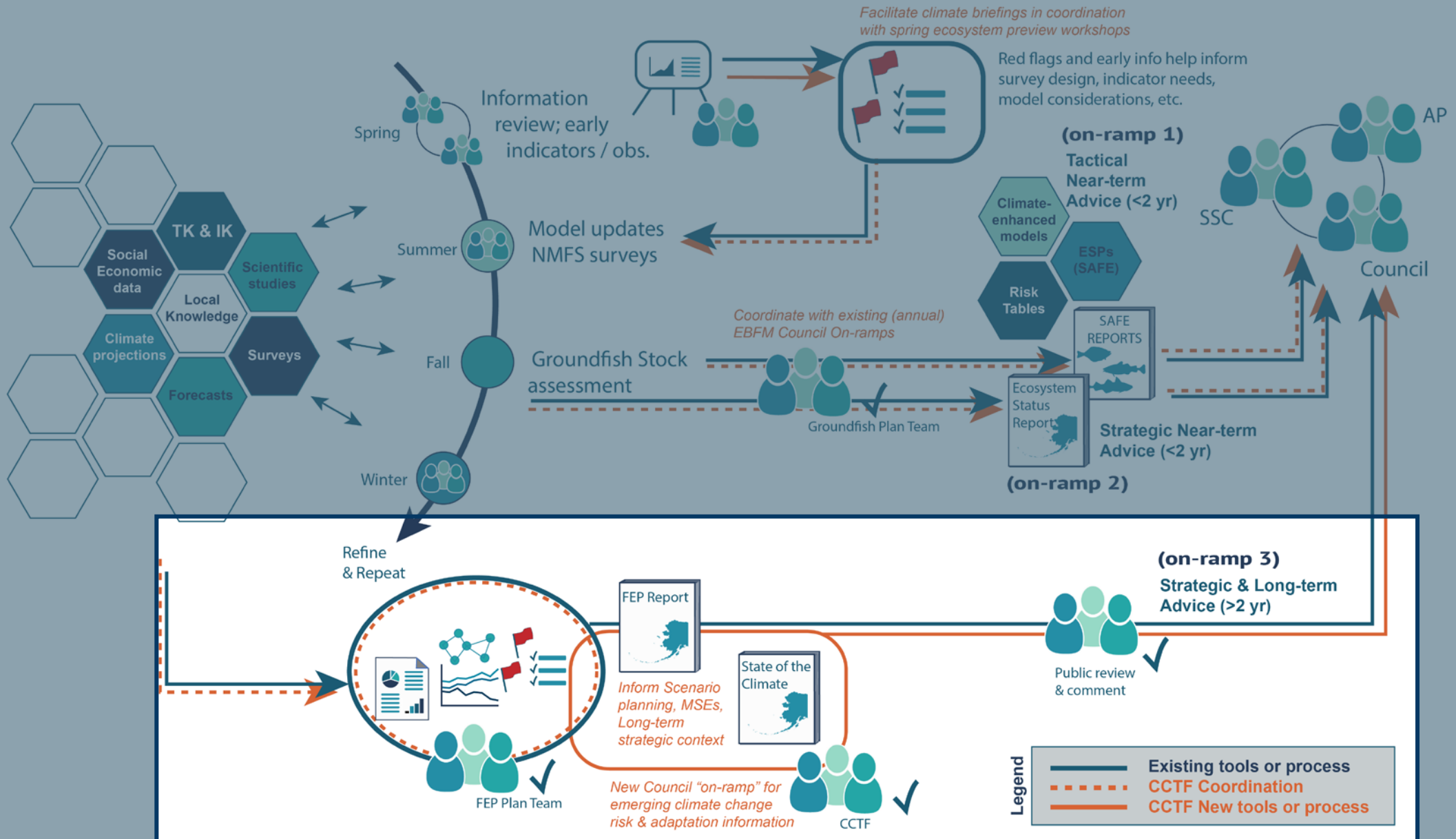
Council process & EBFM Coordination



Climate-informed fisheries management: “on-ramps” and existing coordination

Bering Sea FEP Annual Climate Change Module Work plan Cycle (2021-2025)

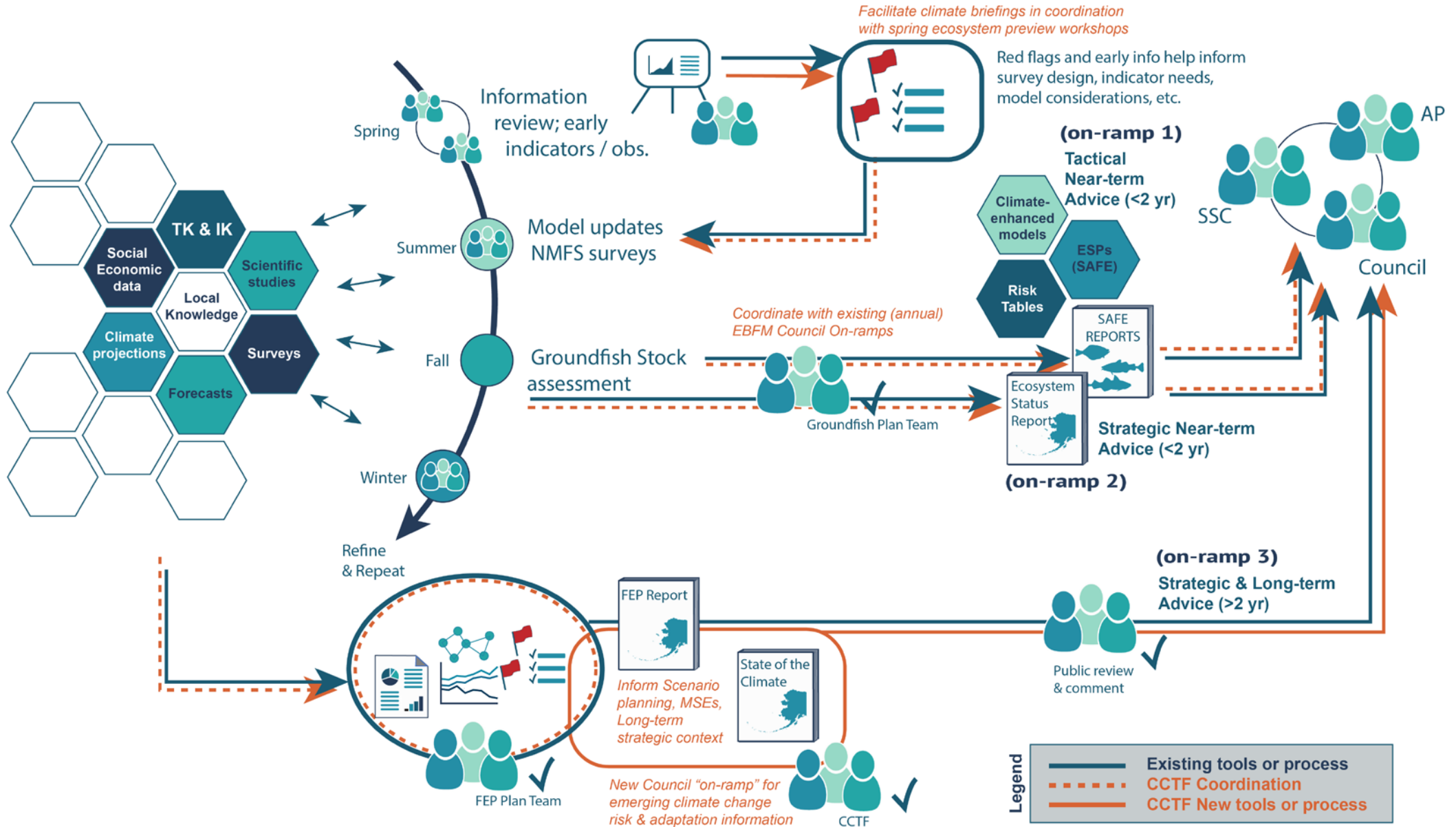
Council process & EBFM Coordination



Climate-informed fisheries management: “on-ramps” and existing coordination

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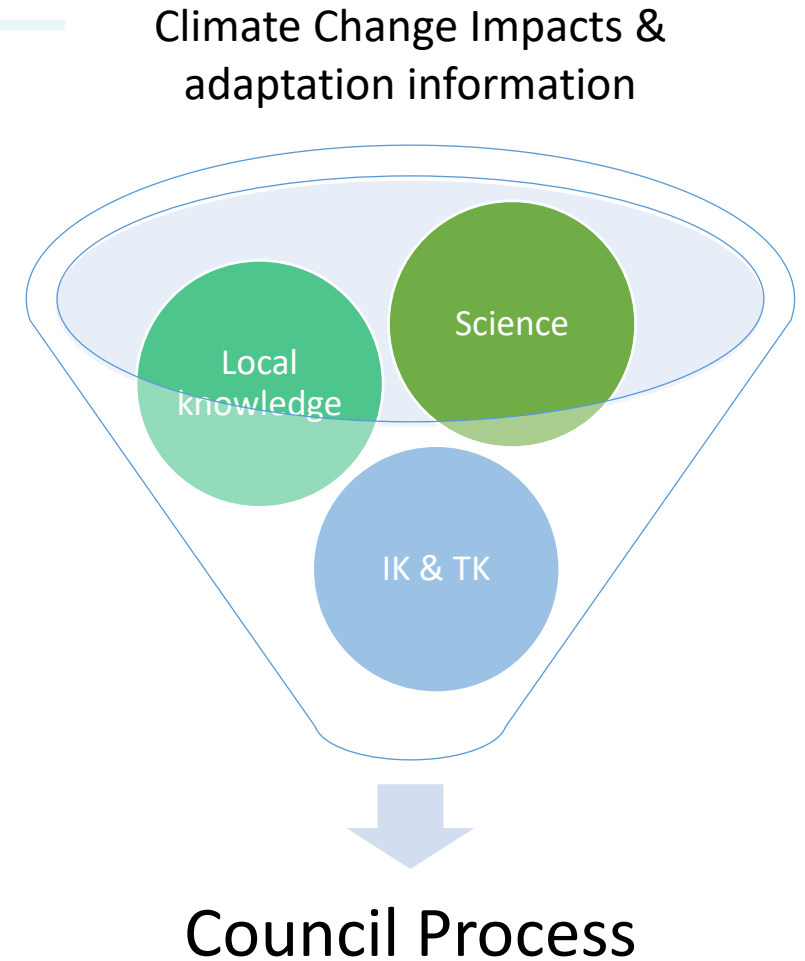


CCTF additional products (Iteratively developed & refine now-2025):

- Synthesis Report Appendices:
 - Table of climate change drivers, impacts, potential policy/management responses, targets, and gaps/needs
 - SES Adaptation Briefing Note
 - SES Resilience Briefing Note
 - ~~Climate Briefing Form and Process~~
 - ~~Adaptation and Climate Testimonial workshop summaries~~
- Coordination with LK/TK/Subsistence Taskforce and the BS FEP Team to communicate issues/topics of joint relevance
- Periodic updates with SSC, Plan Teams, and Ecosystem Committee to provide interim synthetic climate information ***Every 6 mo***

Feedback from SSC

- How frequently would you like to hear from the CCTF? 6 mo? Annually?
- Workplan feedback or questions?



Appendices



Appendix 1

Working draft of Adaptation in the Bering Sea coupled social- ecological system

Overview:

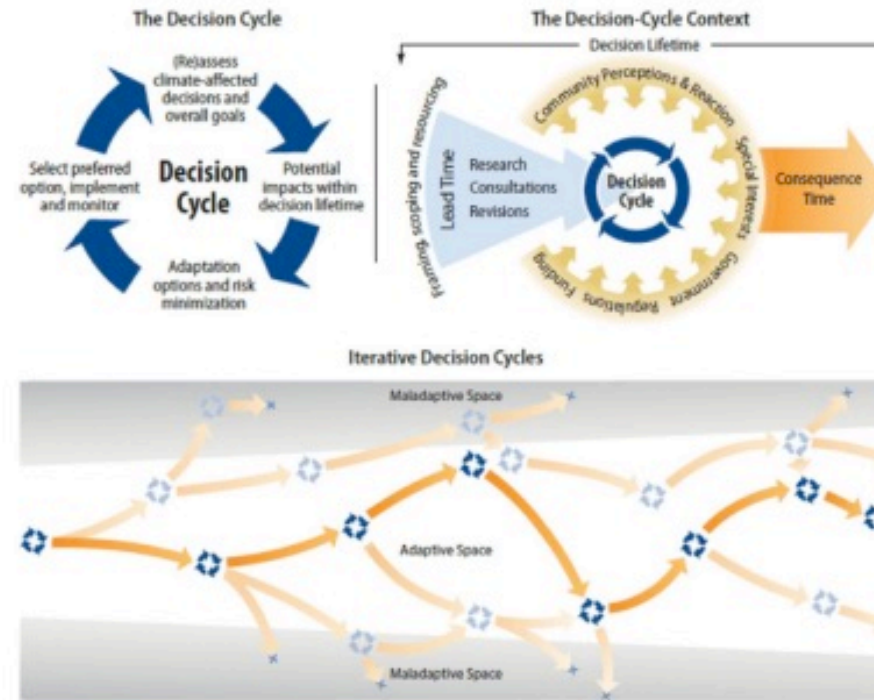
The CCTF aims for an inclusive process in developing recommendations and when assessing risks, impacts, and tradeoffs. The latter relies on understanding and considering biological trajectories of change as well as the social, cultural, and economic implications and scope of adaptation in the intricately coupled social-ecological Bering Sea system. Therefore the CCTF will develop and update (as needed) definitions of “adaptation” and “resilience” in terms of climate change and Bering sea fisheries ,as well as attendant metrics and indicators of progress (or limitations) towards implementation and performance. The IPCC definitions for “adaptation” and “resilience” and the CCTF preliminary definitions of each are provided below and included here as starting points for discussion. The focus on these definitions is intended to provide clarity for the success of the work plan. They will be updated with input from and collaborative engagement with stakeholders, and the CCTF will maintain evolving documents describing Adaptation and Resilience in the Appendices to the work plan that provide more detailed definition and descriptions.

Adaptation definition (draft):

The IPCC defines adaptation as “the process of adjustment to actual or expected climate change and its effects” (IPCC 2014, p. 5). In the context of Bering Sea fisheries, adaptation to support climate resilient social-ecological systems includes ecosystem-based management policies that embrace uncertainty, adjust at a rate that is consistent with observed changes (e.g., allows communities and fisheries to adapt in a proactive rather than a solely reactive manner), are inclusive of diverse knowledge sources and

Appendix 2

Resilience of the Bering Sea coupled social-ecological system



Overview

As the CCTF seeks to provide information recommendations to help the Council advance adaptive management that helps ensure resilient ecosystems, fisheries, and communities, it seems wise to have working definitions of those terms. The IPCC definitions for "adaptation" and "resilience" and the CCTF preliminary definitions of each are provided in the CCTF workplan and included as starting points for discussion. The CCTF intends to work collaboratively with stakeholders to periodically update and revise

EXTRA SLIDES FOR DISCUSSION



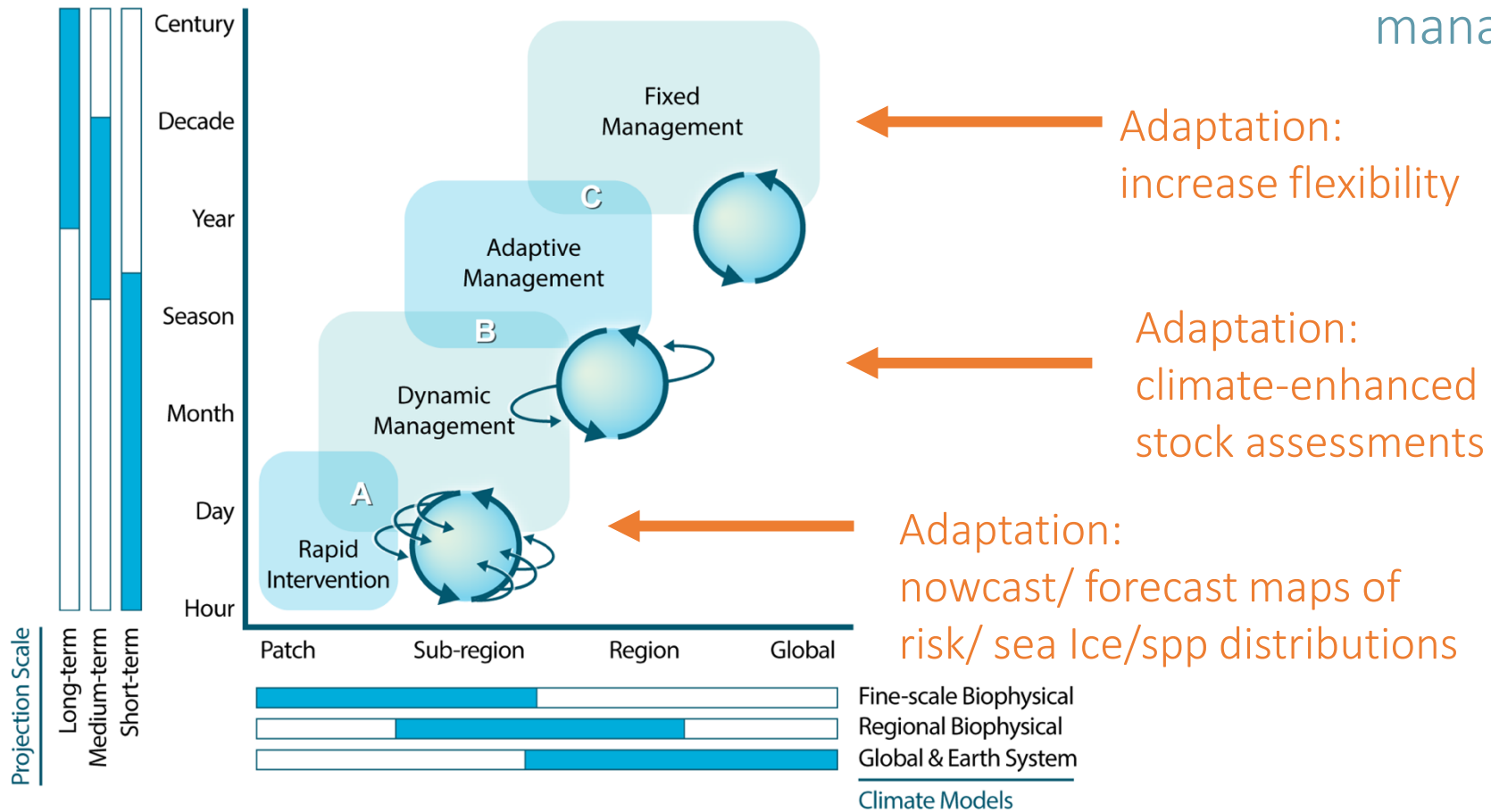
Integrating the module into existing Council process

- “complement existing delivery of EBM advice to the Council process by organizing and synthesizing the breadth of climate information”
- “systematic review of new and emergent climate change information, both immediate and long-term in scope”
- “synthesis and evaluation of key issues, emergent trends, and potential red flags relevant to the Council”
- “communication and iterative review with the LK/TK/Subsistence Task Force and FEP Team to support the diversity of perspectives and knowledge sources needed for evaluations of risk”
- “identification of climate-resilient management actions to enable adaptation to climate-driven change (this particular point would be in the form of recommendations that can be considered by the Council through the Council process)”
- “As much as possible we will work with existing teams and products (such as the Ecosystem Status Report teams) to minimize the amount of reporting and review and avoid duplication of existing efforts.”



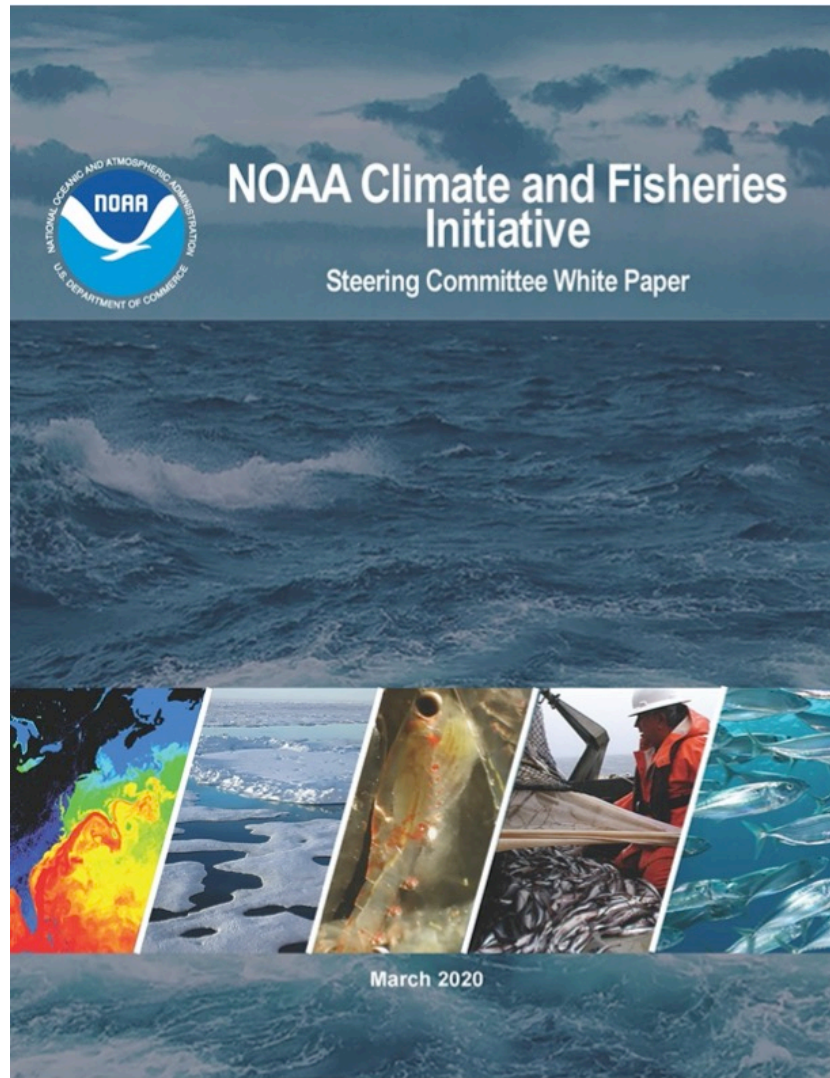
Management can reduce risks & support adaptation

Consider nested scales of management & adaptation

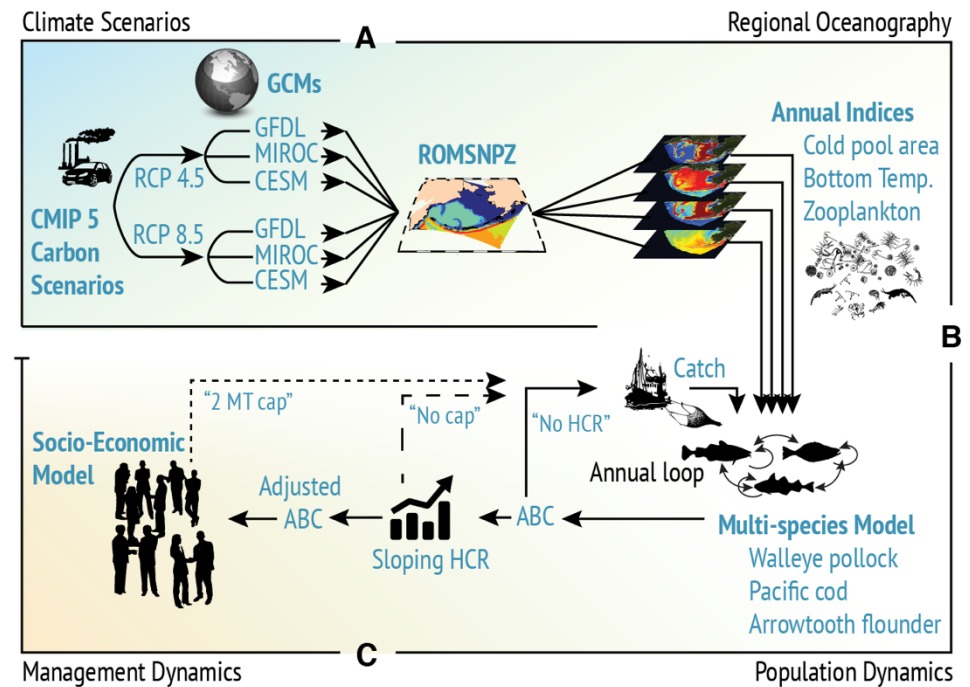


Holsman et al.(2019). Towards climate resiliency in fisheries management. *ICES Journal of Marine Science*. <https://doi.org/10.1093/icesjms/fsz031>

Climate Fisheries Initiative (CFI)



ACLIM as a test bed for operationalized climate-informed fisheries advice



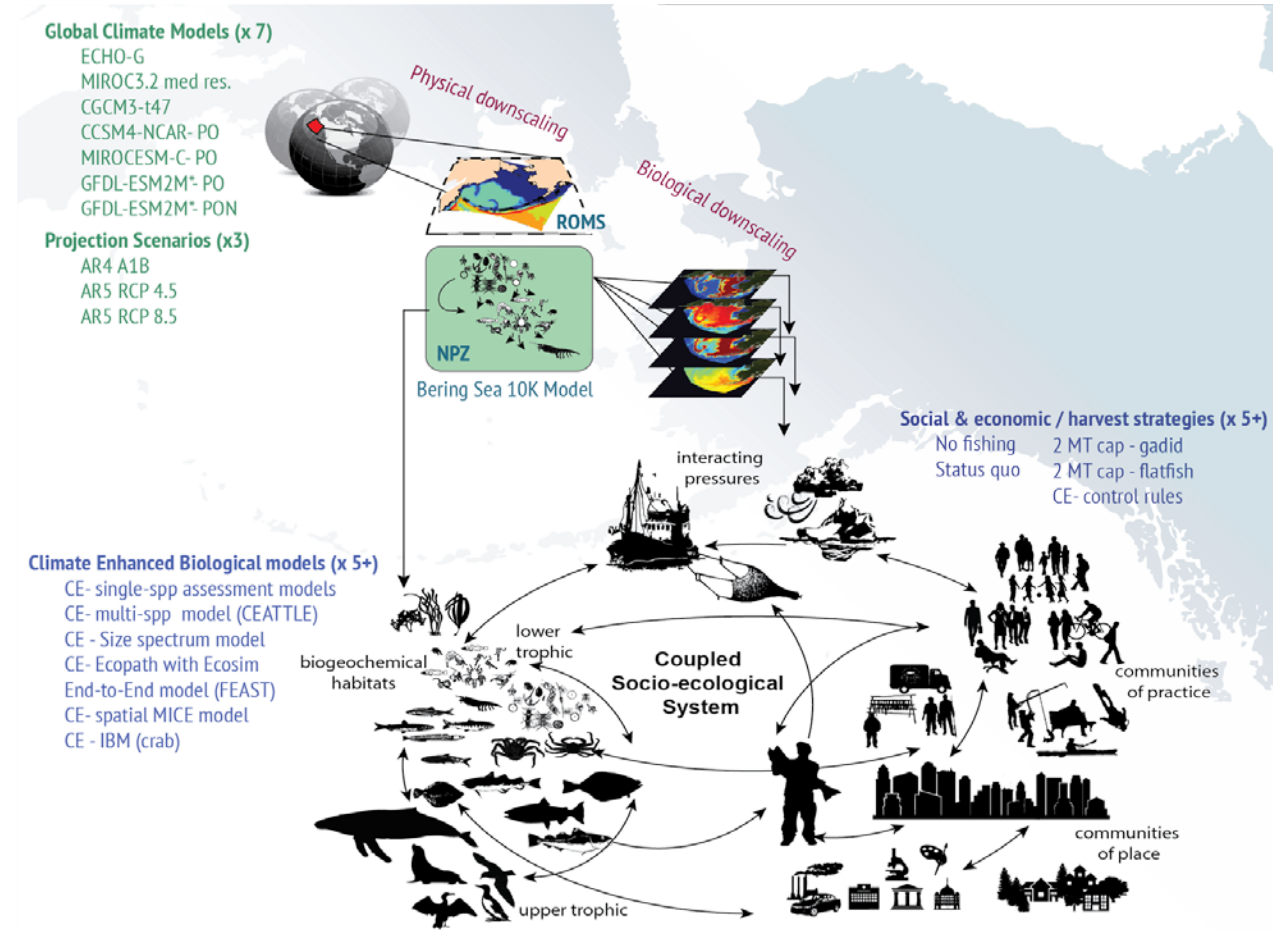
The Alaska Climate Integrated Modeling Project

- Southeast Bering Sea
- Funding: NMFS S&T (FATE+SAAM+NPCREP), IEA, RTAP, Economic and Human Dimensions Program, AFSC, OAR)
- Operational suite of coupled socio-ecological models for climate fisheries hindcasts, forecasts, projections and Management Strategy Evaluation

www.fisheries.noaa.gov/alaska/ecosystems/alaska-climate-integrated-modeling-project



NOAA
FISHERIES



Hollowed et al. 2020. Frontiers in Mar. Sci. doi: 10.3389/fmars.2019.00775

Glossary of Terms

- IPCC : United Nations Intergovernmental Panel on Climate Change
- NOAA : National Oceanic and Atmospheric Administration
- NMFS : National Marine Fisheries Service
- Council : North Pacific Fisheries Management Council
- CE - : “Climate Enhanced” -
- GCM : General Circulation Model (Global in scale)
- RCP : Representative (carbon) Concentration Pathway
- FEP : Fisheries Ecosystem Plan
- ROMS : Regional Ocean Modeling System
- NPZ : Nutrient Phytoplankton Zooplankton Model
- CEATTLE Model : Climate Enhanced Assessment with Temperature and Trophic Linkages & Energetics
- FEAST : Forage and Euphausiid Assessment in Space and Time model
- SES : coupled Social-Ecological System

