

CLIMATE CHANGE TASK FORCE WORKPLAN OVERVIEW D3

CCTF Members:

Co-chair: Diana Stram (NPMFC): diana.stram@noaa.gov

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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)

Todd Loomis (Ocean Peace, Inc.)



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.



CCTF MEETINGS TO DATE

- January 2020: spin up meeting and update to Council bodies (Ecosystem Committee, SSC/AP/Council)
- February 2020 CCTF meeting 2:
 - Initial development of framework and proposed process
 - Initial draft of work plan
 - Update to FEP (March meeting)
- December 2020 CCTF meeting 3
- May 2021 CCTF meeting 4



ATTENDEES May 10 & 13, 2021 (VIRTUAL)

Taskforce members in attendance:

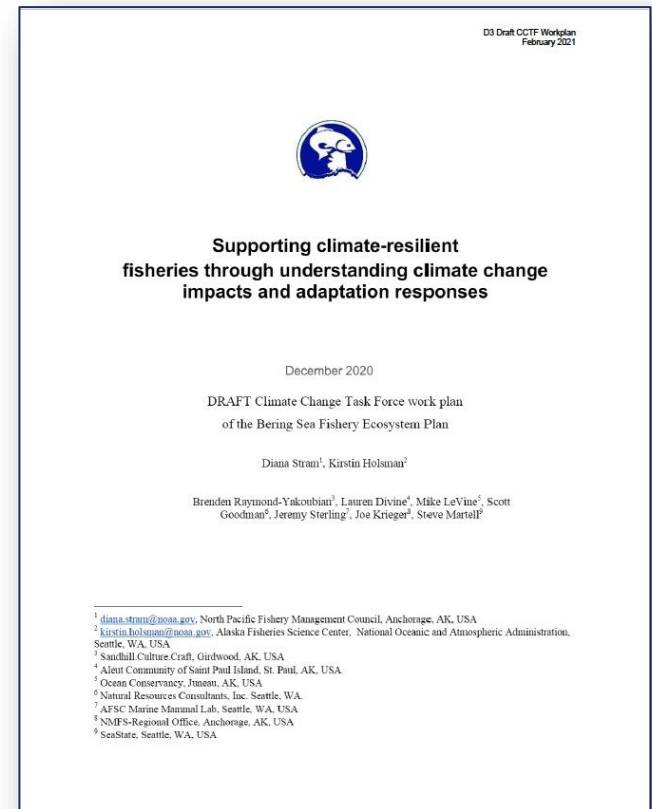
Lauren Divine (Aleut Community of Saint Paul Island), Scott Goodman (Natural Resources Consultants/Bering Sea Fisheries Research Foundation), Kirstin Holsman co-Chair (AFSC-Seattle), Steve Martell (SeaState), Joe Krieger (NMFS-Regional Office), Brenden Raymond-Yakoubian (Sandhill.Culture.Craft), Mike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

Members of the public and other state and agency staff:

Diana Evans, Kerim Aydin, Raychelle Daniel, Scott Miller, Stephanie Madsen, Steve Marx, Megan Williams

Goals of CCTF4:

- Review progress since CCTF3
- Address comments to workplan
- Revise fig. 6
- Identify timeline and deliverables



CCTF Meeting 4 overview

- Workplan finalized, all further revisions will go through linked ‘live’ deliverables document
- “live” glossary of terms added
- plain language added to overview section
- Identified activities for now through Sept 2021
 - ◆ Update table 1 (annual exercise)
 - ◆ FEP Climate Indicators short list
 - ◆ Synthesis of current climate readiness
 - ◆ Outline of Climate change report

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1		CCTF Timeline																						
2				2021												2022								
3				Q1			Q2			Q3			Q4			Q1			Q2			Q3		
4				1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
5		Phase 1: Review and collect information	Progress																					
6		Review previous year's Council reports																						
7		Collate new information																						
8		Provide current state of climate readiness report to FEP team for review and comments																						
9		Provide current state of climate readiness to Council																						
10		Draft Table 1: current climate risks and fishery adaptation options																						
11		Draft conceptual model																						
12		Identify climate indicators for FEP																						
13		Phase 2: Climate Change report																						
14		Draft outline of climate change fishery impacts and adaptation report																						
15		Update current state of climate readiness to Council																						
16		Synthesize key risks																						
17		Synthesize key gaps in feasibility or effectiveness of adaptation actions																						
18		Identify tipping points and limits to adaptation																						
19		First order draft: climate change fishery impacts and adaptation report																						
20		FEP review of climate change report																						
21		Public review of climate change report																						



Objective 1



COLLATE

Coordinate the review of existing and emergent climate information on impacts, adaptation, and residual risk.

Objective 2



SYNTHESIZE

Assess key climate change impacts, adaptation actions, and residual risk.

Objective 3



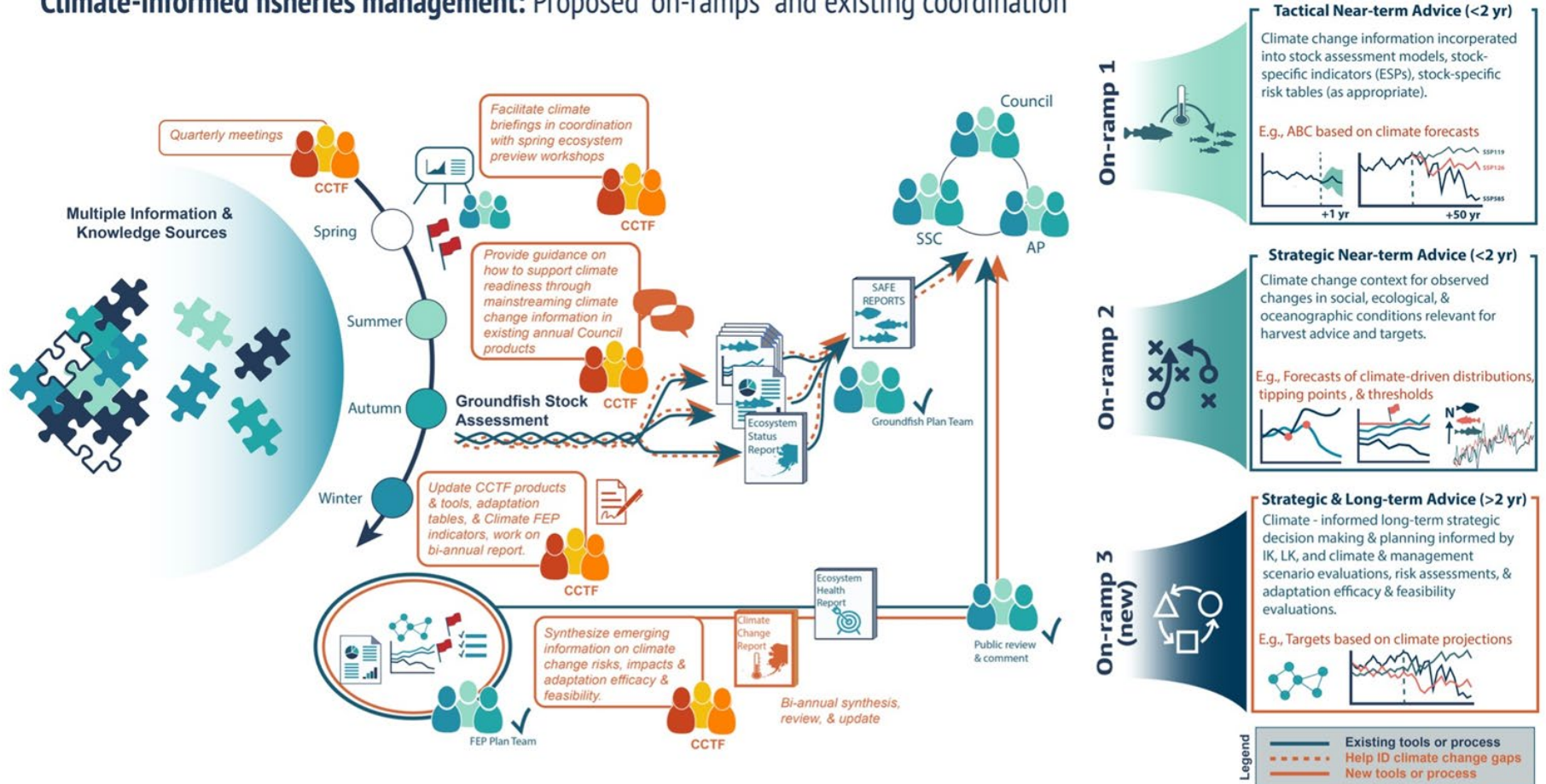
COMMUNICATE

Summarize and communicate potential risks and adaptation actions.

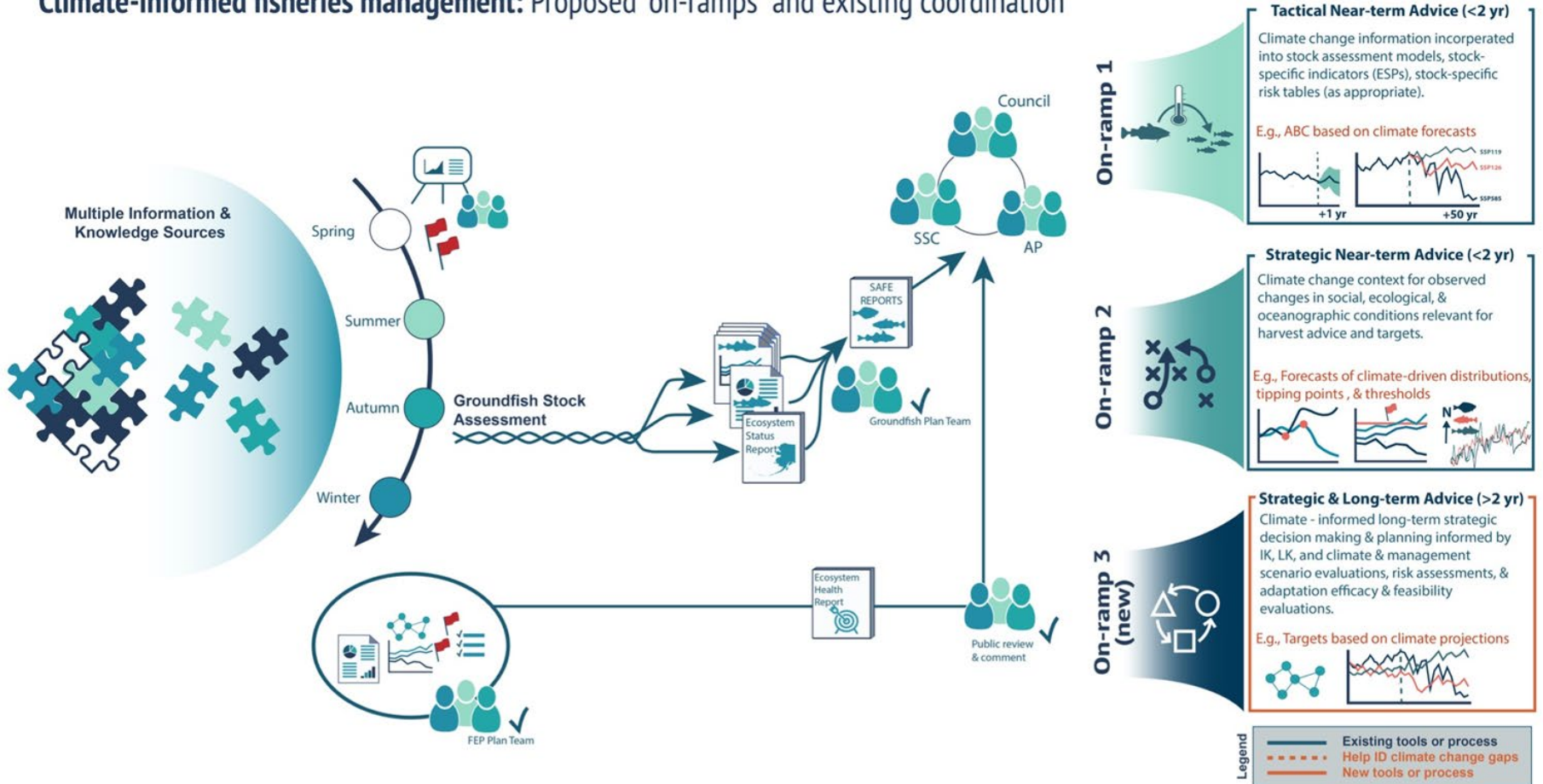
- **Objective 1. Collate:**
Evaluate the mechanisms and processes through which climate change information is currently included in the fishery management process, identify gaps, and help create opportunities to increase the inclusion of available information
- **Objective 2. Synthesize:**
Synthesize information about long-term climate change impacts and scenarios and help create pathways for inclusion of that information in the fishery management process.
- **Objective 3. Communicate:**
Identify potential management tools and actions for consideration by the Council that could help increase resilience and adaptation to climate change impacts



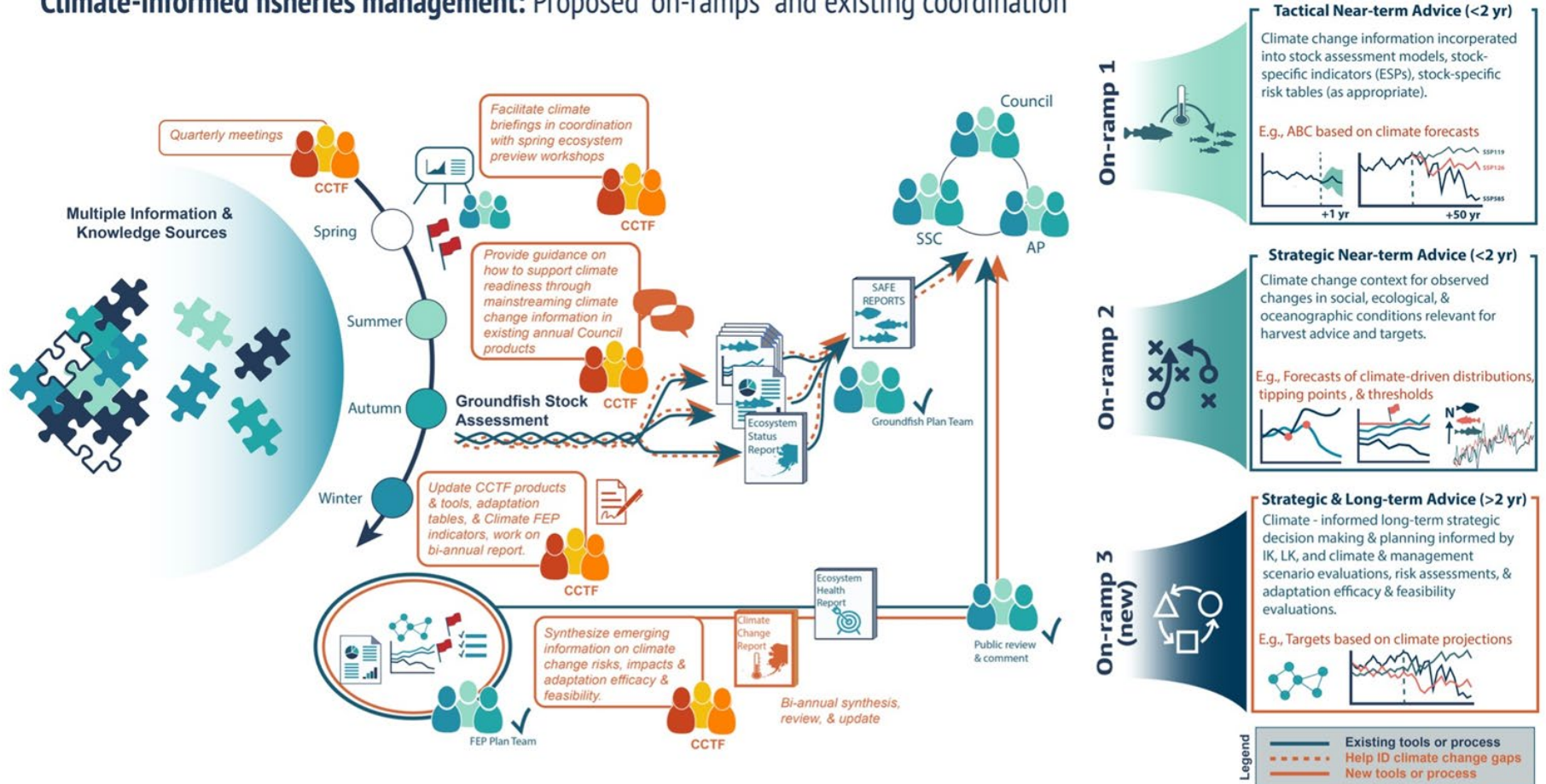
Climate-informed fisheries management: Proposed “on-ramps” and existing coordination



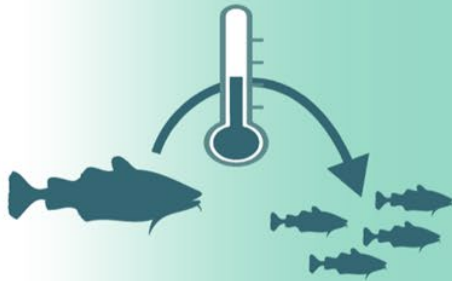
Climate-informed fisheries management: Proposed “on-ramps” and existing coordination



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



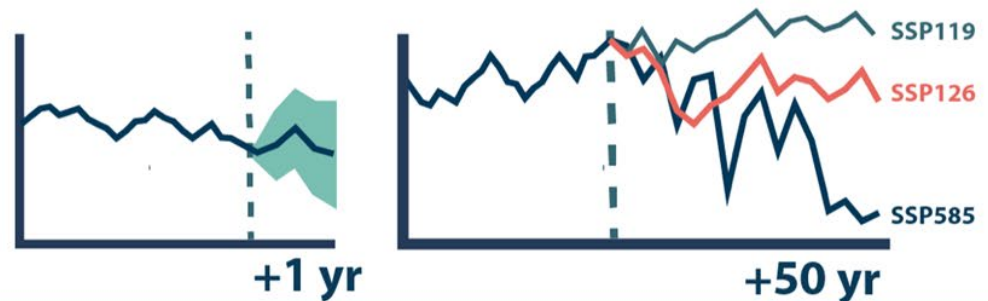
On-ramp 1



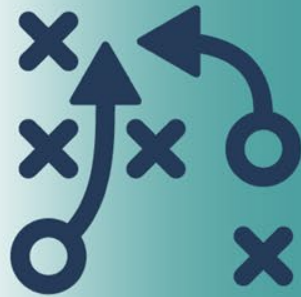
Tactical Near-term Advice (<2 yr)

Climate change information incorporated into stock assessment models, stock-specific indicators (ESPs), stock-specific risk tables (as appropriate).

E.g., ABC based on climate forecasts



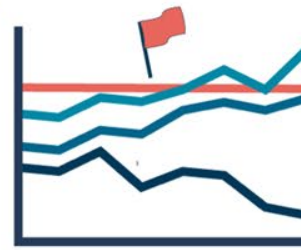
On-ramp 2



Strategic Near-term Advice (<2 yr)

Climate change context for observed changes in social, ecological, & oceanographic conditions relevant for harvest advice and targets.

E.g., Forecasts of climate-driven distributions, tipping points, & thresholds



On-ramp 3 (new)



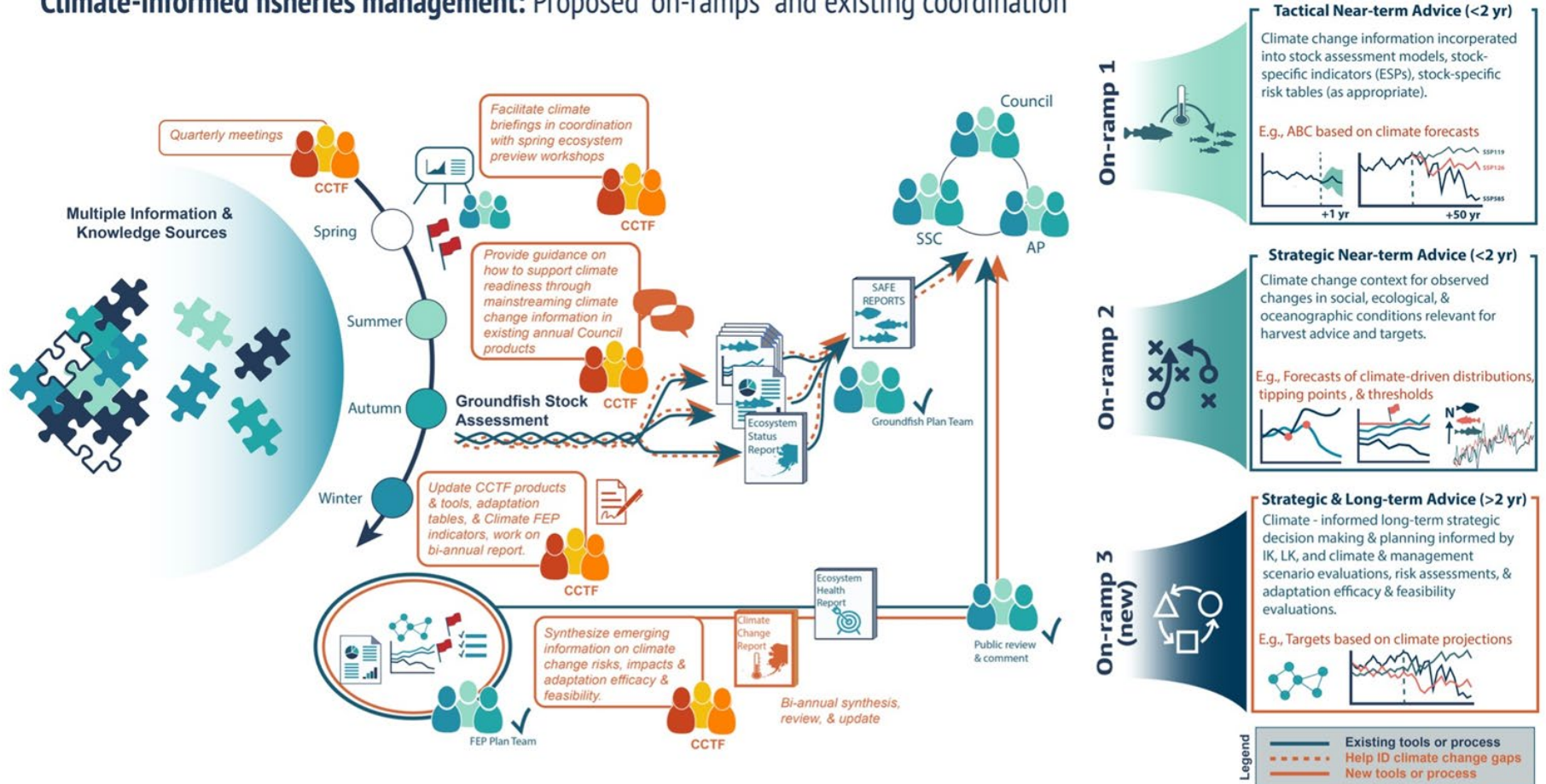
Strategic & Long-term Advice (>2 yr)

Climate - informed long-term strategic decision making & planning informed by IK, LK, and climate & management scenario evaluations, risk assessments, & adaptation efficacy & feasibility evaluations.

E.g., Targets based on climate projections



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



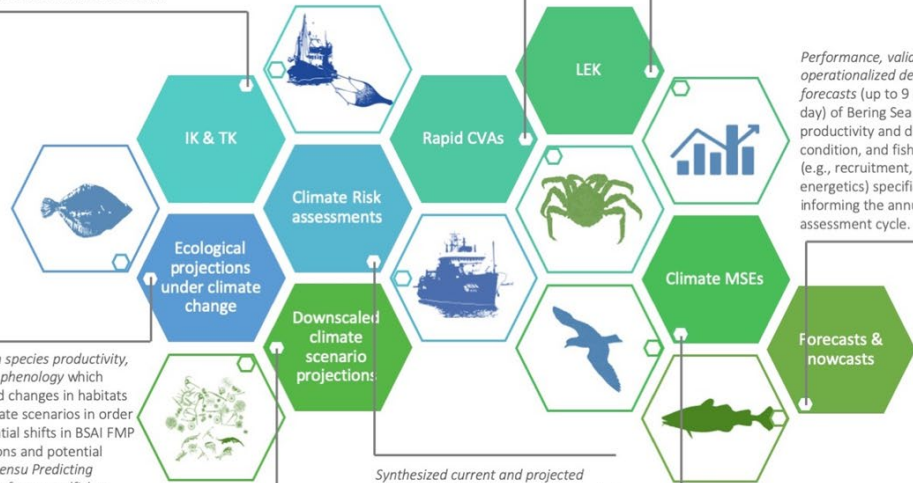
Examples of sources of climate information (Fig. 5)



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.



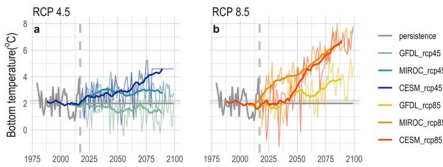
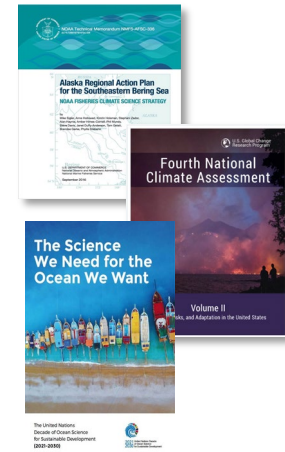
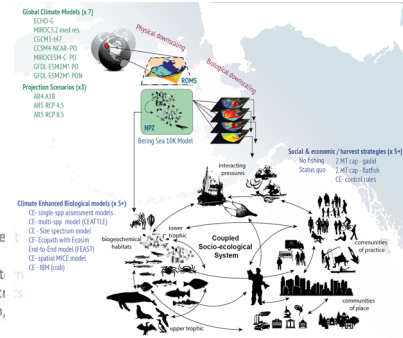
Project changes in species productivity, distributions, and phenology which includes projected changes in habitats under future climate scenarios in order to estimate potential shifts in BSAI FMP species distributions and potential fishing grounds (*sensu* Predicting changes in habitat for groundfishes 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, and other peer-reviewed synthesis reports of climate impacts on Bering sea social and ecological systems.

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.

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.

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.



E.g., Fishery Climate Adaptation Tools

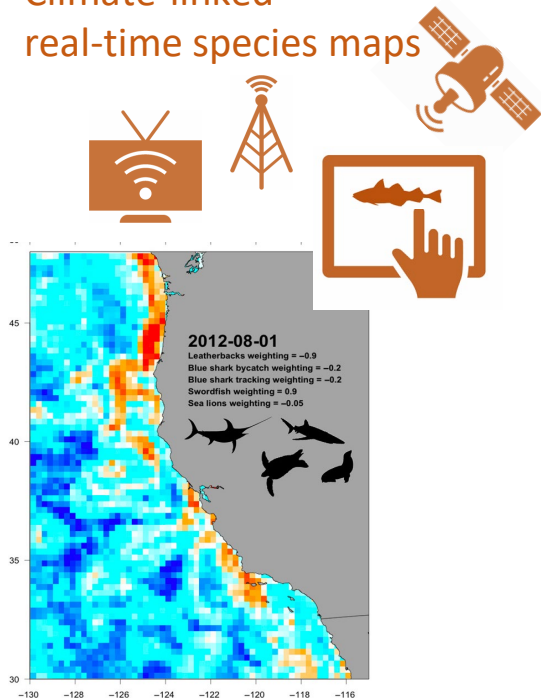


*Adapt in real-time
(incremental adaptation)*

*Minimize impacts through holistic planning
(transformational adaptation)*

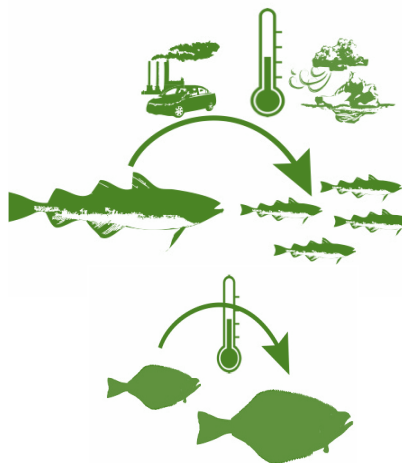


Climate-linked real-time species maps



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>

E.g., Fishery Climate Adaptation Tools

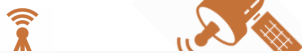


Adapt in real-time
(incremental adaptation)

Minimize impacts through holistic planning
(transformational adaptation)



Climate-linked
real-time species maps



Climate-enhanced stock
Assessment models



Climate smart
long-term strategies



COMMUNICATION

A	B	C	D	E	F	G	H
Driver(s)	Impacts	Potential responses	Resilience target	Gaps/needs	Case study examples	On ramp	Is it already implemented?
<i>Short-term potential actions (1-3 years)</i>							
Marine heatwaves and changes to ocean chemistry; short-term changes in spring and fall bloom, zooplankton abundance and lower food web dynamics	<p>Shift in suitable habitat to NBS (from SEBS)</p> <p>Changes in carrying capacity and juvenile fish productivity, survival, and growth</p> <p>Mismatch in fishery distribution and timing relative to fishery resources that have phenological and/or spatial shifts due to changes in ecological conditions</p> <p>Increased or decreased species overlap lead to changes in risk of incidental bycatch.</p>	<p>Climate informed adaptive EBFM (increased spatial information to include NBS)</p> <p>Implementation of climate-enhanced single- and multi-species reference points (e.g., climate-specific FABC from ecologically-enhanced assessment models).</p> <p>Structured flexibility in the timing of seasonal openings/closures and TAC decisions (i.e., to compensate for shifts under climate change). This could extend into the medium- and long-term, but could be initiated in the short-term.</p> <p>Nowcasts and short-term forecasts of ocean conditions and species distributions can be used to develop real-time by-catch risk maps</p>	<p>Climate-resilient fisheries management approaches that are flexible enough to adjust to shifts in species distributions and abundances</p> <p>Understanding of economic, non-economic sociocultural, and biological impacts of changes in fisheries resulting from climate change.</p>	<p>Adaptive EBFM already in place. Some work needed to evaluate the performance of EBFM that additionally includes spatial/movement information. Genetic evidence of stock structure, historical distribution and abundance baseline information needed.</p> <p>Research ongoing, some ready for operationalization. MSEs being evaluated under ACLIM, priorities for MSE species and scenarios needed.</p> <p>Test-cases whereby flexible measures could be implemented</p>	<p>Marine heatwave driven declines in recruitment and fish condition in the SEBS in pollock and Pacific cod in the SEBS</p>	<p>On ramp: ESP indicator for pacific cod</p>	

Plan is to map these sort of actions into a dynamic 'live' table (Table 1) to characterize the portfolio of tools available for the Bering Sea



	A	B	C	D	E
1	Driver(s)	Impacts	Potential responses	Resilience target	Gaps/needs
2	<i>Short-term potential actions (1-3 years)</i>				
3		Shift in suitable habitat to NBS (from SEBS)	Climate informed adaptive EBFM (increased spatial information to include NBS)	Climate-resilient fisheries management approaches that are flexible enough to adjust to shifts in species distributions and abundances	Adaptive EBFM already in place. Some work needed to evaluate the performance of EBFM that additionally includes spatial/movement information. Genetic evaluation of stock structure, historical distribution and abundance baseline information needed.
4	Marine heatwaves and changes to ocean chemistry; short-term changes in spring and fall bloom, zooplankton abundance and lower food web dynamics	Changes in carrying capacity and juvenile fish productivity, survival, and growth	Implementation of climate-enhanced single- and multi-species reference points (e.g., climate-specific FABC from ecologically-enhanced assessment models).		Research ongoing, some ready for operationalization. MSEs being evaluated under ACLIM, priorities for species and scenarios needed.
5		Mismatch in fishery distribution and timing relative to fishery resources that have phenological and/or spatial shifts due to changes in ecological conditions	Structured flexibility in the timing of seasonal openings/closures and TAC decisions (i.e., to compensate for shifts under climate change). This could extend into the medium- and long-term, but could be initiated in the short-term.	Understanding of economic, non-economic sociocultural, and biological impacts of changes in fisheries resulting from climate change.	Test-cases whereby flexible measures could be implemented
6		Increased or decreased species overlap lead to changes in risk of incidental bycatch.	Nowcasts and short-term forecasts of ocean conditions and species distributions can be used to develop real-time by-catch risk maps	Increased efficiency, technological and communication tools to avoid bycatch hotspots	Sea-state provides a good example of this approach; need to provide coupled climate-fishery models based tools and dynamic management approaches for species

Organized into short-term (1-3 yrs) , medium term (5-10 yrs) and long term (> 10 yrs) potential actions



“Live” Glossary of Terms

https://docs.google.com/document/d/1FUlpaXWzPhPS_MUXWd_hV6kGfBUWSaSXtkI5PVmWODI/edit#

Climate Change Task Force Glossary of Terms 2021

Table of contents

Social - ecological system (SES)	2
Residual Risk	2
Acronyms	4
AP: Advisory panel	4
CCTF: Climate change task force (of the FEP)	4
CE - : “Climate Enhanced” -	4
Council : North Pacific Fisheries Management Council	4
ESR: Ecosystem Status Report	4
ESP: Ecosystem and Socioeconomic Profile	4
FEP: Fisheries Ecosystem Plan	4
GCM: General Circulation Model (Global in scale)	4
IK: Indigenous Knowledge	4
IPCC: United Nations Intergovernmental Panel on Climate Change	4
LK: Local Knowledge	4
NMFS: National Marine Fisheries Service	4
NOAA: National Oceanic and Atmospheric Administration	4
RCP: Representative (carbon) Concentration Pathway	4
SSC: Scientific and Statistical Committee	4
TK: Traditional Knowledge	4



Additional Issues to address

→ Task Force and FEP Coordination

◆ How best can TFs and FEP team connected/coordinate?

- Monthly meeting between FEP, CCTF, and LKTKS co-chairs
- Coordination meetings every 6 mo?
- Include FEP Team on email updates of progress/etc as reported out to Council when FEP does not meet prior

→ What will the climate briefing look like?

- ◆ Review of current state of climate readiness (new)
- ◆ Synthesis of risk and adaptation efficacy/feasibility

→ Process by which new on ramps developed under CCTF process will be taken up moving forward from 2025 - i.e., who will be responsible for these tasks post 2025

→ Indicator development:

- ◆ Possible sub-group across TF and FEP for indicators?

