

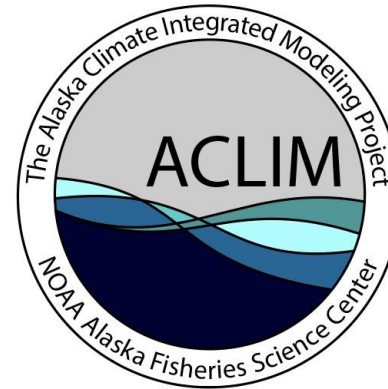


D6 Bering Sea FEP Climate Change Taskforce

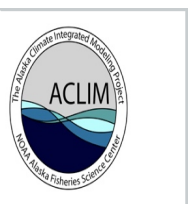
- 1. a) ACLIM and IPCC update**
- 1. b) Climate Readiness Synthesis report**
- 2. c) CCTF report and 2022-23 workplan**

**Dr. Diana Stram (NPFMC) and Dr. Kirstin Holsman (AFSC)
Council October 2022**

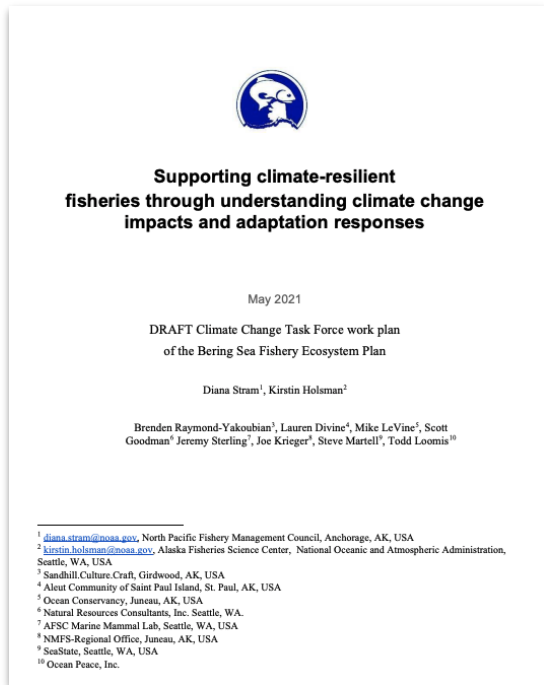
ACLIM & Climate informed advice



Dr. Kirstin K. Holsman
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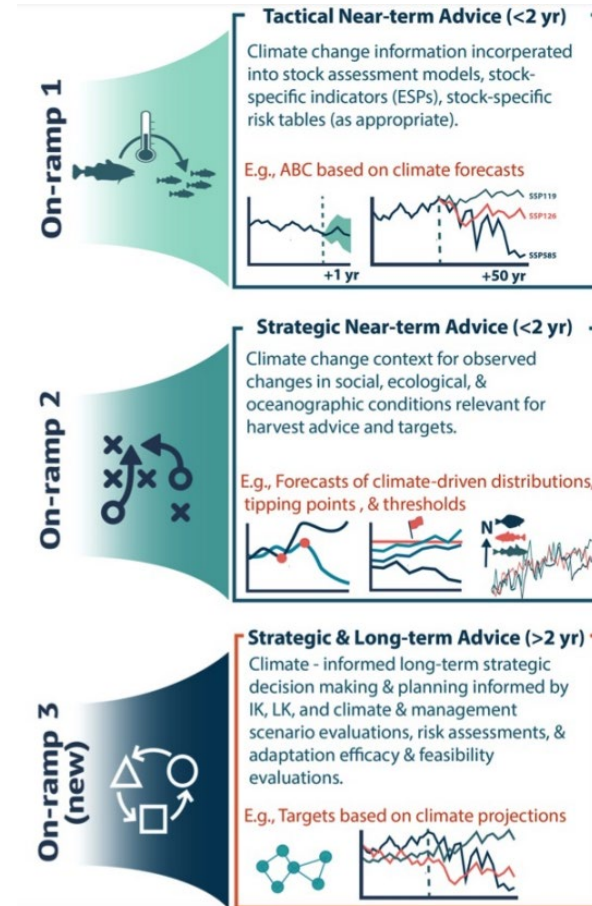


Provide tools and approaches to support climate informed management decisions



<https://www.npfmc.org/climatechangetaskforce/>
 Stram et al. 2021

Climate information on ramps for fisheries management



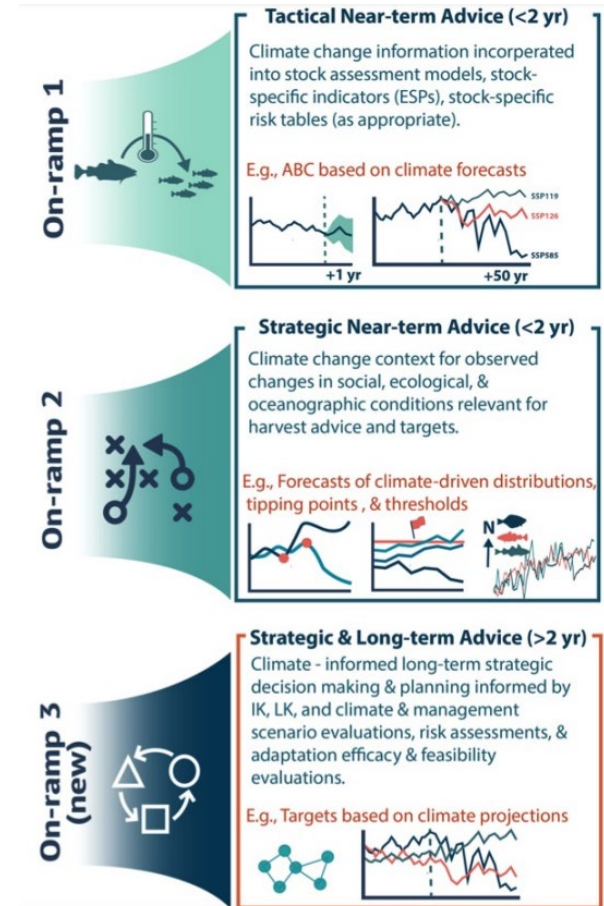
Provide tools and approaches to support climate informed management decisions

Climate information on ramps for fisheries management

Climate informed annual* stock assessments & advice

Climate information in near-term management targets

Climate information in long-term management targets and design

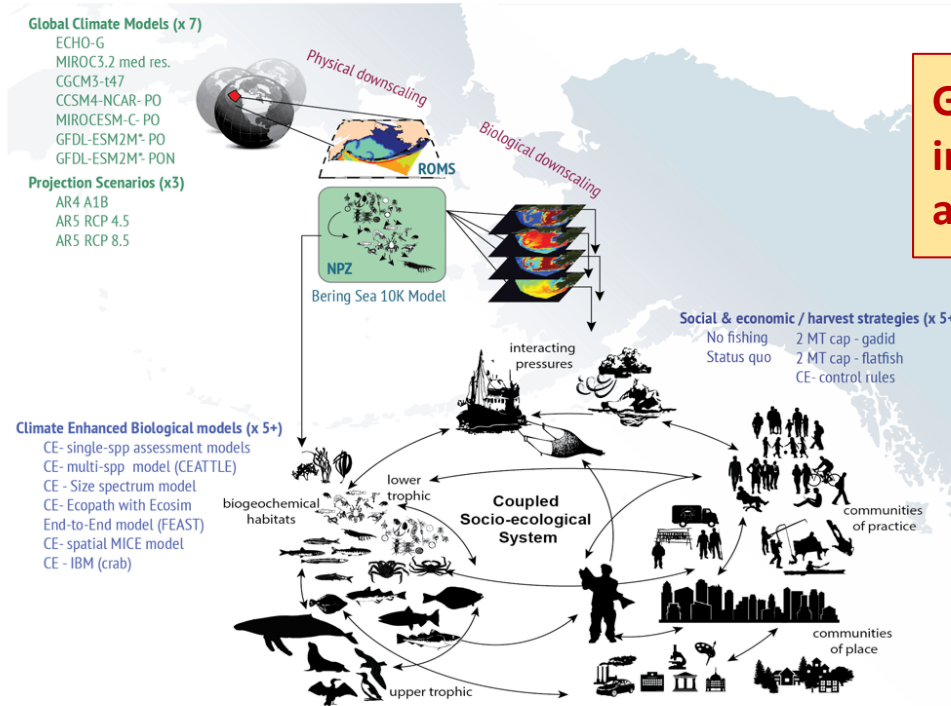


<https://www.npfmc.org/climatechangetaskforce/>

The Alaska Climate Integrated Modeling Project



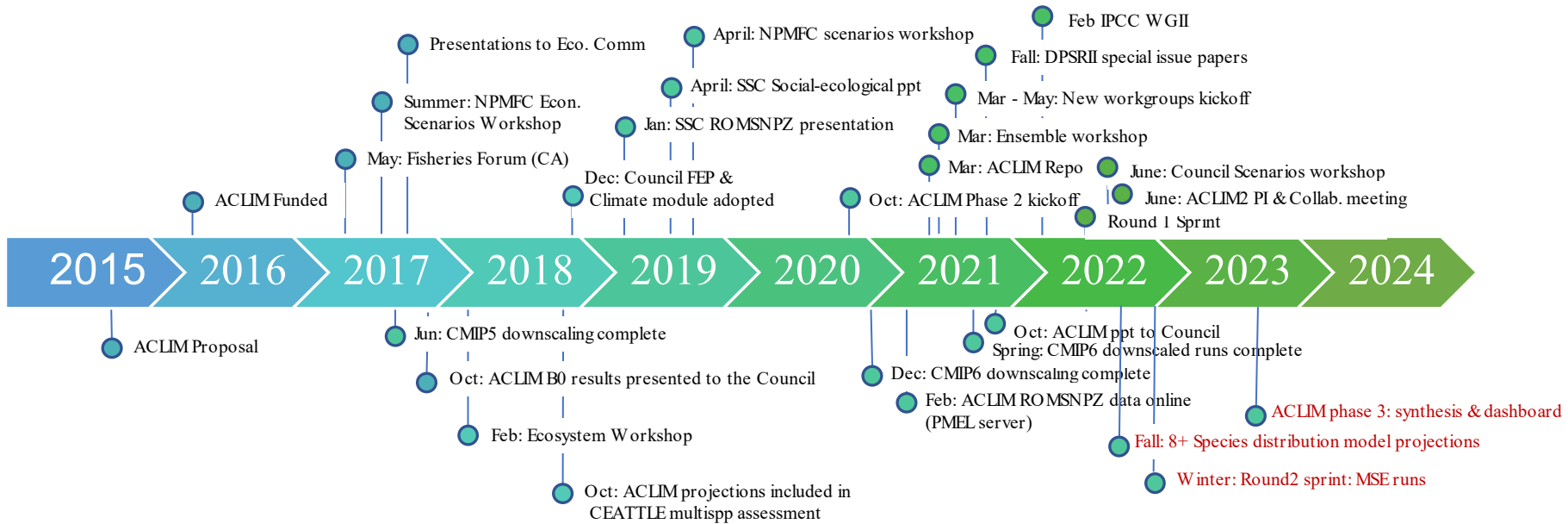
www.fisheries.noaa.gov/alaska/ecosystems/alaska-climate-integrated-modeling-project



Goal: To address climate information needs with best available science & tools



ACLIM Timeline





Key elements of climate ready advice

Rapid response

Plan & predict, near-real time alerts, emergency aid, triage impacts, enable individual adaptation

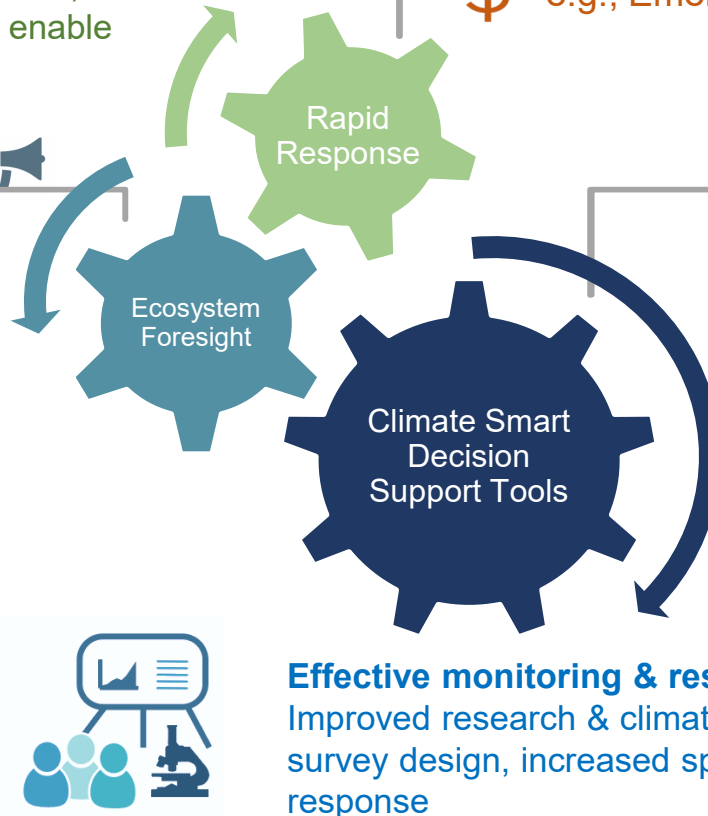
 e.g., Emergency relief

Ecosystem foresight

Social-ecological system forecasts & projections, tipping points & early warnings

Coordinated science & advice

Inter- & intra-agency coordination, Indigenous partnerships, national strategies aligned with regional priorities, efficient information sharing, reduced redundancy



Climate smart decision support tools

Climate enhanced stock assessments, climate informed advice & tools, dynamic management



e.g., Risk assessment & probability of increase or decrease

Effective monitoring & research

Improved research & climate-ready survey design, increased speed of response

Holsman et al. in prep

Climate, Ecosystems, & Fisheries Initiative (CEFI)

National Marine Fisheries Service | NOAA CLIMATE, ECOSYSTEMS, AND FISHERIES INITIATIVE

CEFI Integrated Ocean Modeling and Decision Support System



Operational support for Climate-informed fisheries & ecosystem management advice

<https://www.fisheries.noaa.gov/topic/climate-change/climate,-ecosystems,-and-fisheries>

Two way information exchange: regional, national, & International Advice



- Food & nutritional security
- Adaptation
- Social-ecological system risk

CLIMATE CHANGE TASK FORCE

Climate Readiness Synthesis

CCTF Members:

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

Co-chair: Kirstin Holsman (NMFS- AFSC) : kirstin.holsman@noaa.gov

Lauren Divine (Aleut Community of Saint Paul Island)

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

Jason Gasper (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.



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



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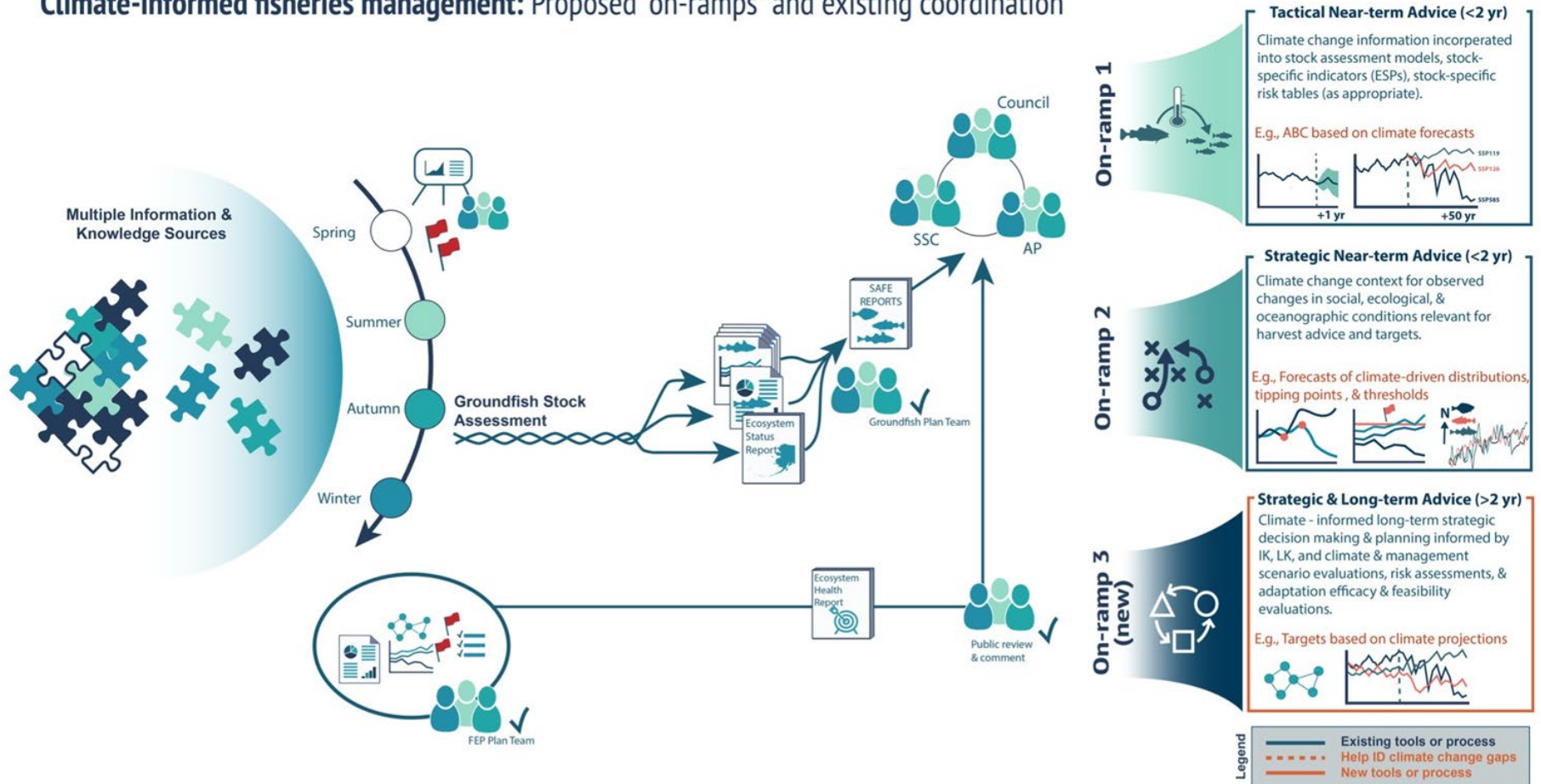
Synthesize information about long-term climate change impacts and scenarios and help create pathways for inclusion of that information in the fishery management process.

- **Objective 3. Communicate:**

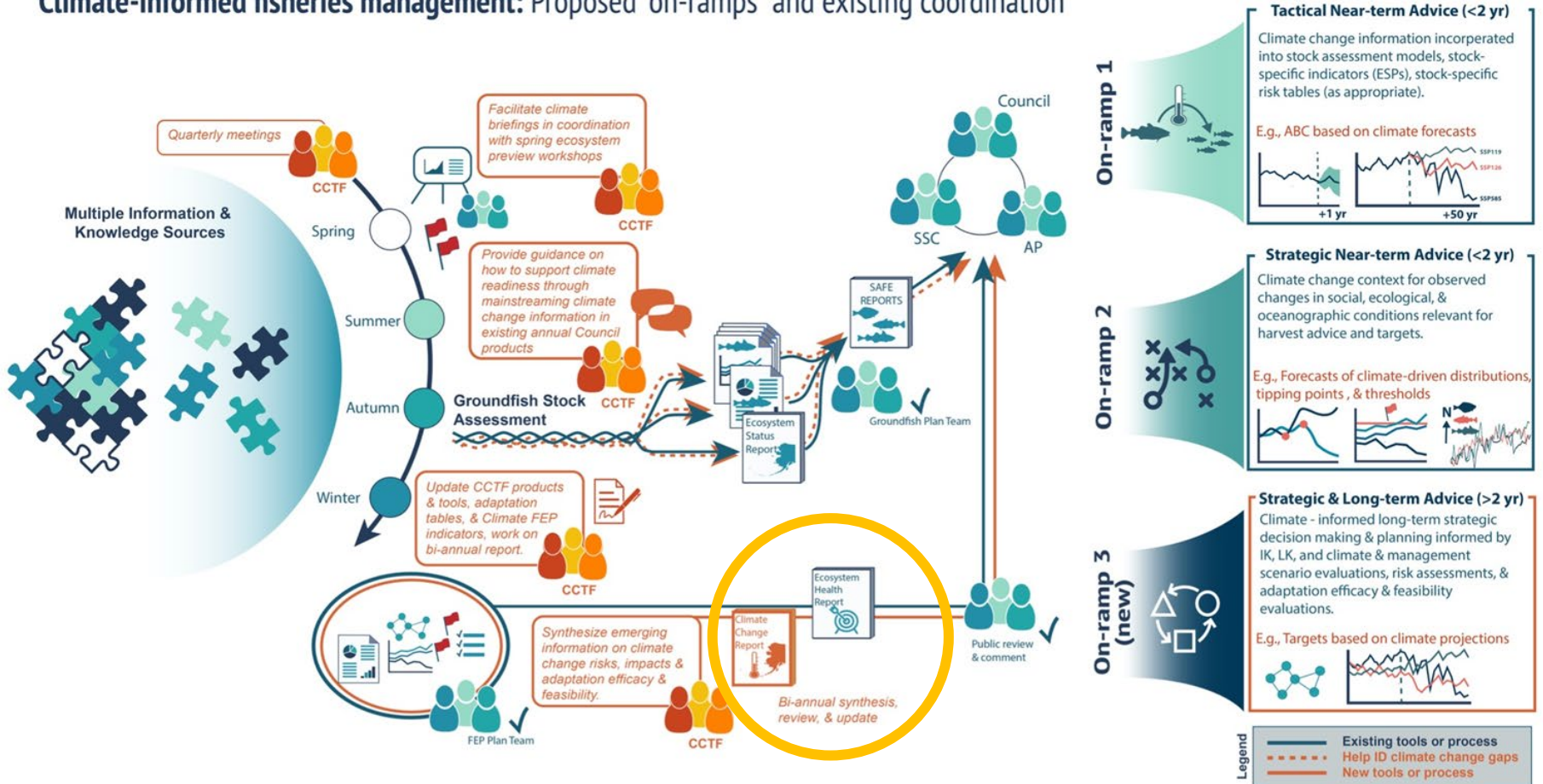
Identify potential management tools and actions for consideration by the Council that could help increase resilience and adaptation to climate change impacts



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

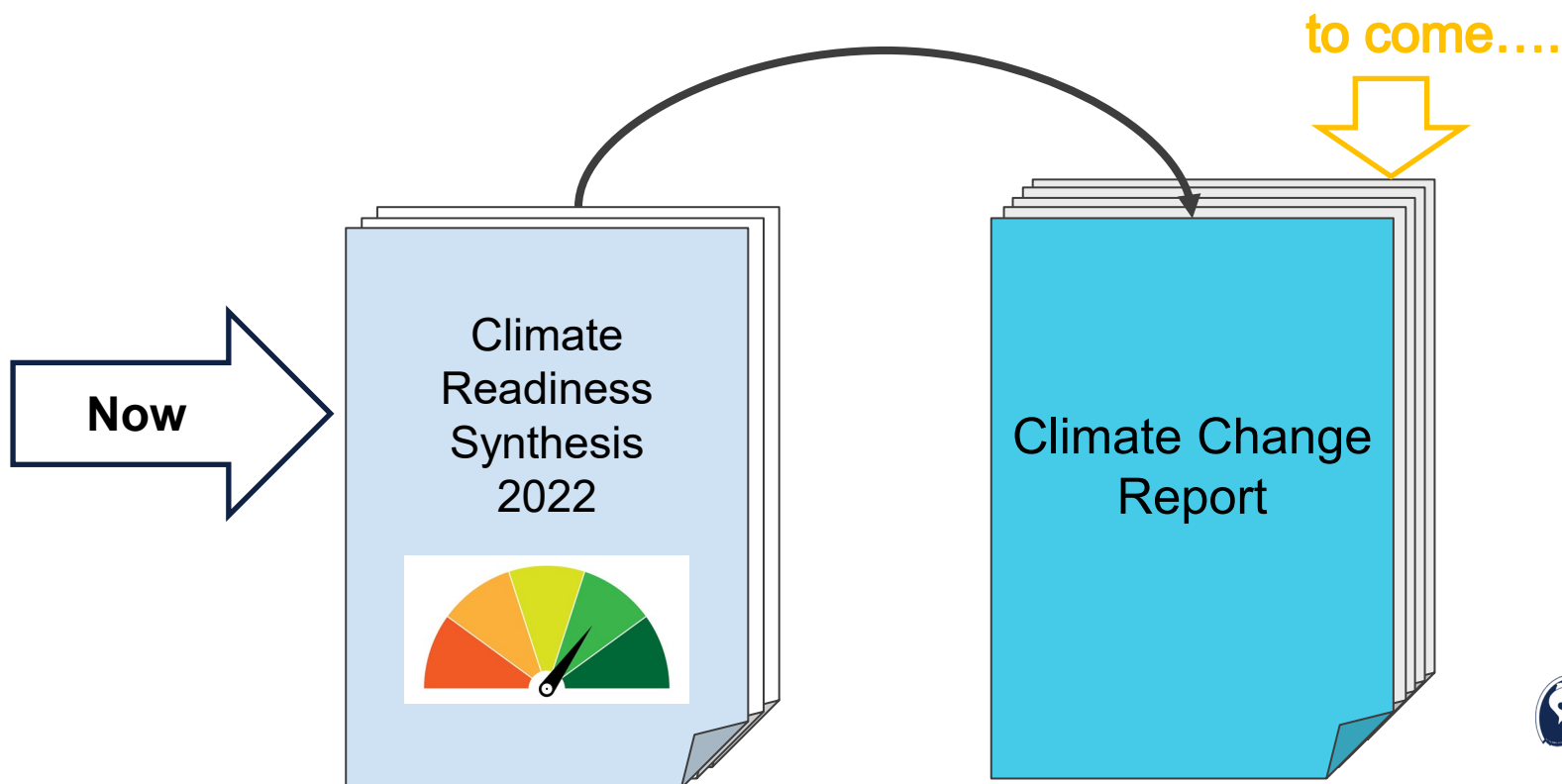


Climate-informed fisheries management: Proposed “on-ramps” and existing coordination



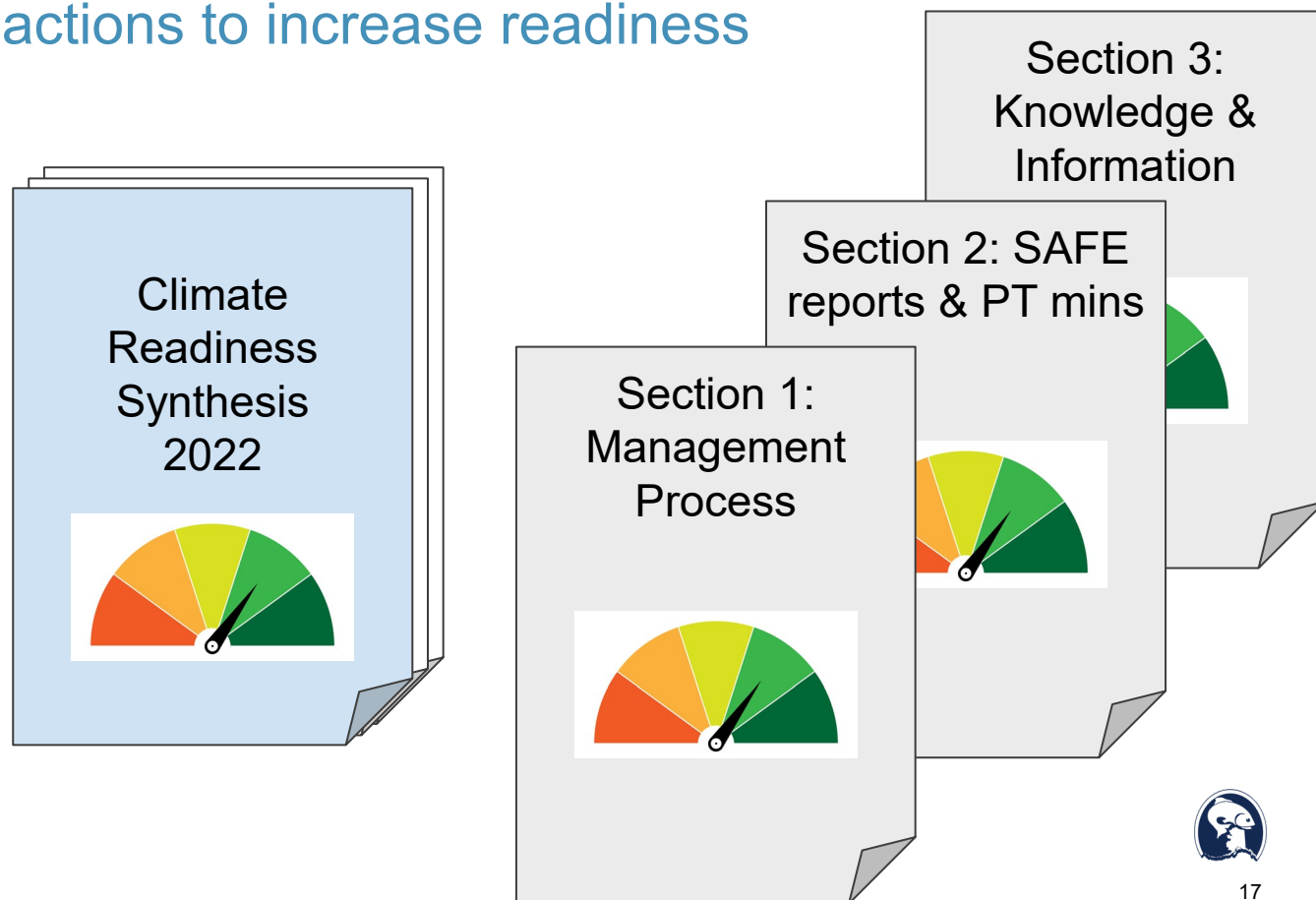
Climate Readiness Synthesis (2022)

Assessment of climate change readiness
& near-term actions to increase readiness



Climate Readiness Synthesis (2022)

Assessment of climate change readiness
& near term actions to increase readiness



Climate Readiness

Measure of the degree to which the system is designed to be resilient to climate change:

- Information, advice and decision-making includes measures specifically aimed to be robust to long-term climate change, absorb climate shocks and facilitate equitable and timely responses to unprecedented conditions and challenges.
- Climate ready policies CAN build off effective tools and processes already in place but through lens of climate change ensure the system is robust to climate change and supports:
 - Adaptation
 - Resilience
 - Sustains ecosystem, people and livelihoods



Climate Readiness (p. 6)

Resilience

- Coupled social-ecological systems. Includes but not limited to:
 - Biological and genetic diversity
 - Economic vitality
 - Sociocultural prosperity
 - Community sustainability and engagement
 - Co-management
 - Food security

Adaptation

- Ecosystem-based policy decisions that:
 - Include uncertainty
 - Adjust and evolve at a rate that is consistent with observed changes and sources of information
 - Inclusive of diverse knowledge sources
 - Consider direct and indirect impacts and interactions with other species, sectors stakeholders and the environment



Ranking

- Expert opinion based categorical characterization of readiness level for relative context for current and future climate informed advice and adaptation measures
- To be viewed in a relative context and NOT a measure of effectiveness



Management Overview ranking

Ranking	Description	Section specific details
1. Not Ready	No climate information included in management measures	Management measures are not designed to address climate change
2. On the way to climate ready	Some implicit climate <u>variability</u> information associated with management measures	Conceptually climate information informs management measure but is not directly implemented
3. Somewhat ready	Some implicit climate <u>change</u> information included in management	Some measures built into management to address climate change or changing environmental conditions
4. Nearly ready	Few modifications would result in climate readiness	Management measures have built in mechanisms to be responsive to changing environmental conditions and climate change
5. Climate ready	Process in place for regular (operational) climate change informed management	Management measures are designed to address climate change and climate extremes and provide informative feedback on performance

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Case Studies (Management)

- Table 1.2 more examples
- Herring Savings Area
- Northern Bering Sea Research Area
- OY range
- Industry led measures

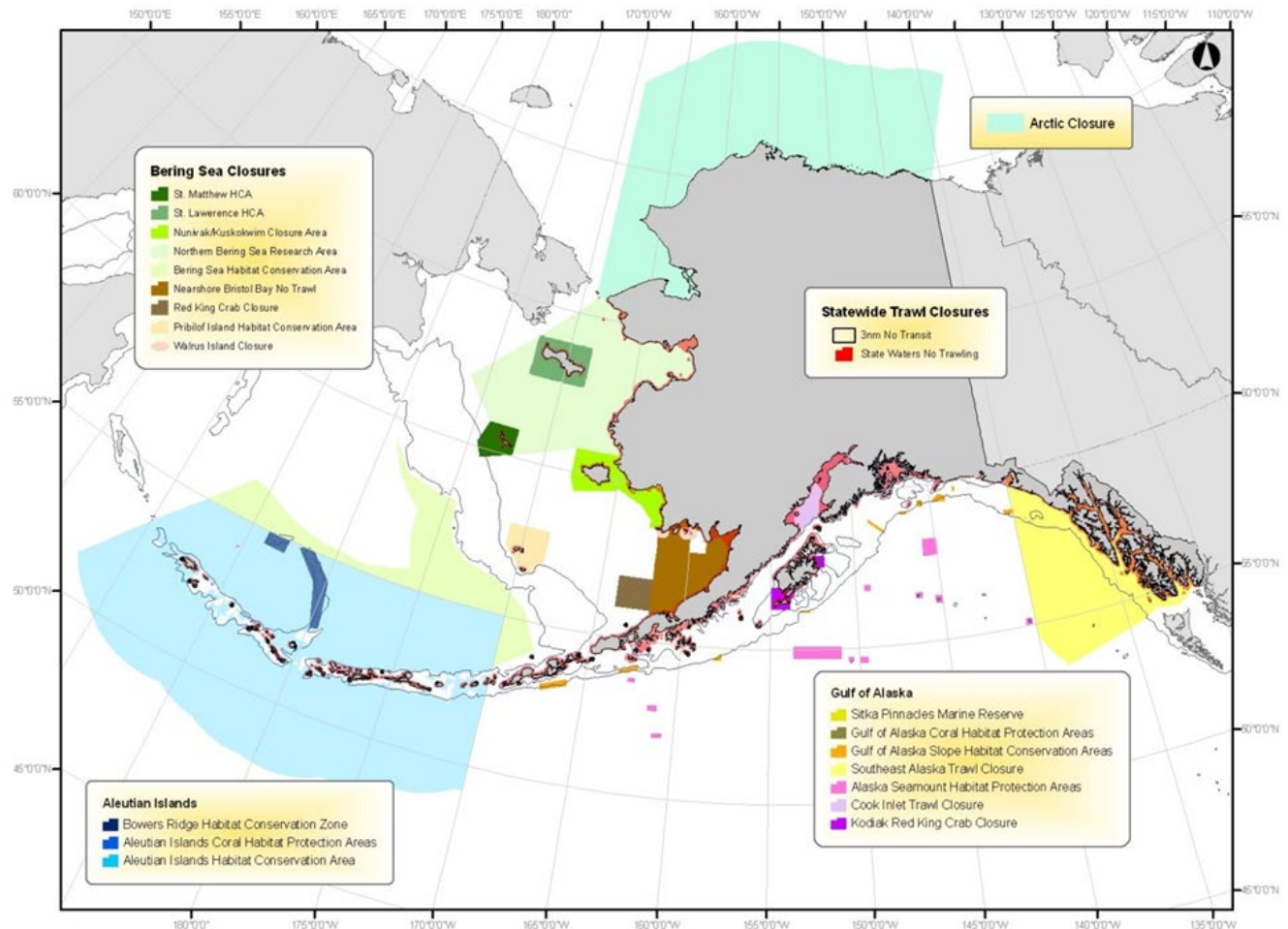


Table 1.2 Management measures and potential strengths and weaknesses

Management Measures

Special Area Management	Quota Programs	Seasonal and Sector Reallocations	Retention Restrictions	TAC Adjustments/ exchanges	Data Integration	Industry-led Measures
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Examples of current actions

NBSRA



Herring Savings area

Northern Bering Sea Research Area

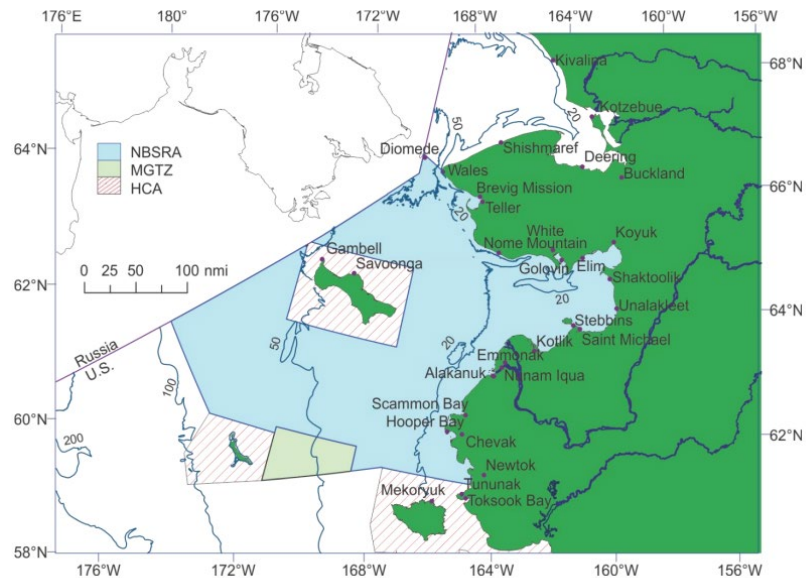


Table 1.2 Management measures and potential strengths and weaknesses

Management Measures

	Special Area Management	Quota Programs	Seasonal and Sector Reallocations	Retention Restrictions	TAC Adjustments/ exchanges	Data Integration	Industry-led Measures
Potential Climate Change Adaptive Attributes (Strengths)	<p>NBSRA implemented in part to address concerns with newly ice-free waters and the resulting change in distribution of fish and crab populations. Precautionary measure to prohibit trawling until better understanding of impacts of bottom trawling on benthic and epibenthic fauna</p>						



Table 1.2 Management measures and potential strengths weaknesses

	Special Area Management	Quota Programs	Seasonal and Sector Reallocations	Retention Restrictions	TAC Adjustments/ exchanges	Data Integration	Industry-led Measures
<p>Potential Maladaptive Attributes (weakness)</p>	<p>Static fixed trawl closure that has yet to be effectively evaluated.</p>						



Table 1.2 Management measures and potential strengths and weaknesses

Opportunities for improvements

Special Area Management

Quota Programs

Seasonal and Sector Reallocations

Retention Restrictions

TAC Adjustments/ exchanges

Data Integration

Industry-led Measures

Consider flexibility or more dynamic closure potential. Research in benthic and epibenthic impacts critical to informing management options



1.6.1 Near-term considerations

- Explore the performance of, and feasibility to implement, spatial and temporal dynamic management measures through case studies

CCTF workshop to solicit additional stakeholder feedback?

- Development of metrics to evaluate climate resilience in management measures
- Evaluate / re-evaluate OY cap performance under climate change and alternative sub-designs (e.g, proportional caps, dynamic as function of climate indices) below the 2MT to ensure this measure continues to impart stability and productivity benefits under future change.
- Identify enabling factors to support industry led measures to increase rapid adaptation, reduce impacts, and respond to climate driven changes (e.g., communication and near-real time information sharing).



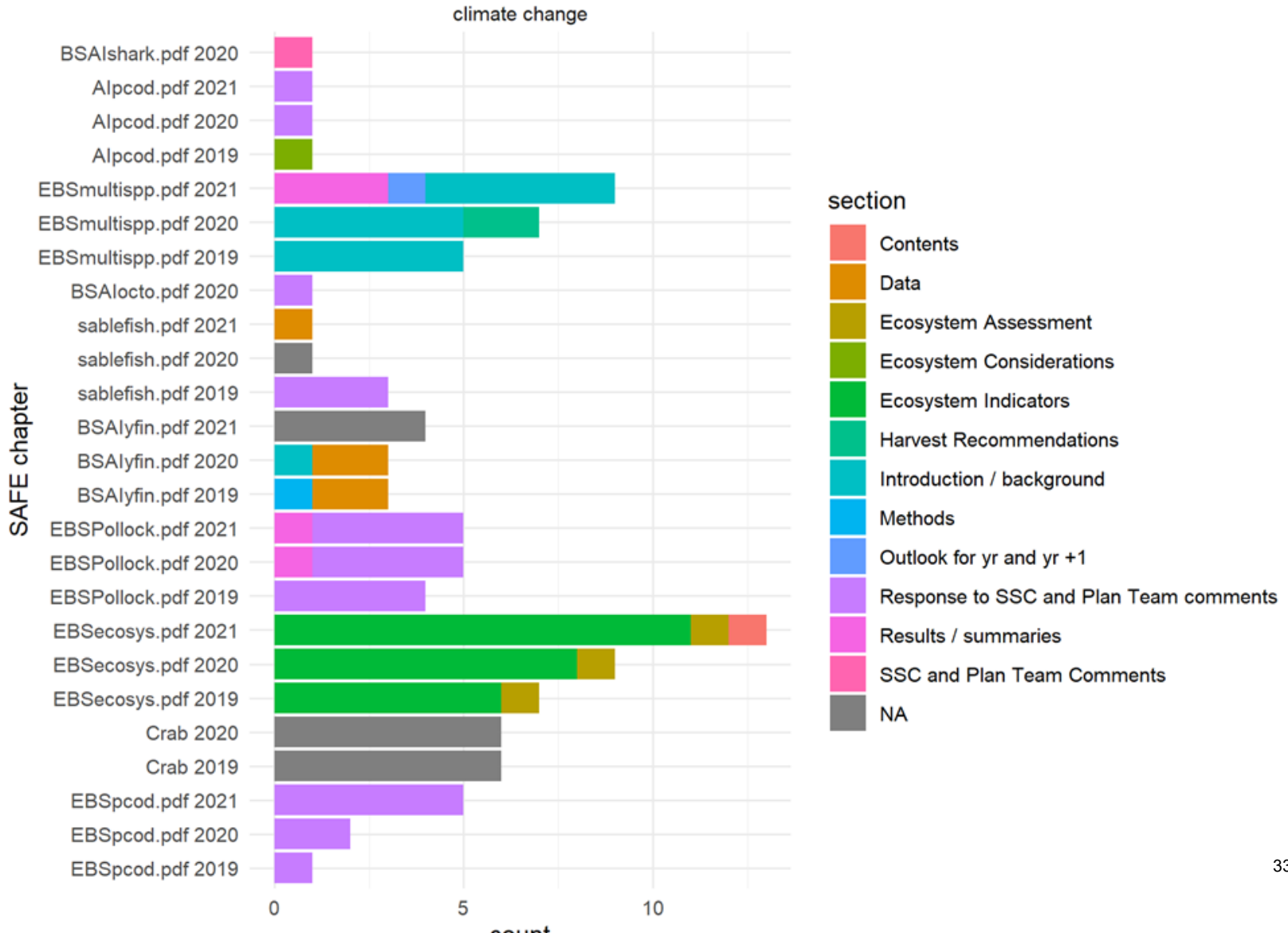
SAFE Report Ranking

Ranking	Description	Section specific details
1. Not Ready	No climate information included	Climate change information does not occur implicitly or explicitly in the assessment model, text, or advice.
2. On the way to climate ready	Some implicit climate <u>variability</u> information included	Climate and ecological information is included in the assessment but climate change information does not occur implicitly or explicitly in the assessment model, text, or advice.
3. Somewhat ready	Some implicit climate <u>change</u> information included	Climate and ecological information is included in the assessment but climate change information is implicit only (not explicitly discussed) in the assessment model, text, or advice.
4. Nearly ready	Few modifications would result in climate readiness	Climate and ecological information is included in the assessment but climate change information is only explicitly discussed in a few places to set the context for future directions but it is not used to explain trends or future directions, nor is used to adjust ABC, modify the model, or provide other advice.
5. Climate ready	Process and information in place for regular (operational) climate change informed advice	Climate change information is used to explain trends or future directions (or lack of sensitivity to climate change), and is used to adjust ABC, modify the model, or provide other advice. The assessment is therefore “climate change informed”.

SAFE Report Ranking

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Figure 21



Near term on ramps:

Potential on-ramps	Near Term Feasibility
1. Indicator / climate change section in ESR	
a. Add ESR indicator regarding long term projections of climate variables (e.g., bottom temperature, cold pool, OA)	High
b. Add climate change synthesis section, similar to the climate variability and forecast section (Bond et al.) of the ESR	Medium
2. Separate section in SAFE or an independent climate change report	Low-Medium (requires an author to produce annually)
3. Intro section for each SAFE report could include a climate change section (e.g., in the ecosystem section)	Medium- High
4. SAFE Chapters (each species individual assessment) could include climate change information	Medium
a. Species specific climate change paragraph in each safe chapter	Medium
b. Each stock assessment chapter could include a climate change information section or slightly modified ESP	
c. Risk, vulnerability (and adaptation potential) table	
d. Safe author survey of climate readiness of each stock (based on their opinion and set criteria for climate readiness)	
5. Econ Safe Report could include climate change information (especially around risk, portfolio approaches to reduce risk, and future opportunities)	Low-medium
a. General paragraph on climate change, global demand, and global to regional economics	
b. Risk, vulnerability (and adaptation potential) table	
c. Synthesis of integrated socio-econ MSE results (e.g. ACLIM)	
6. Include a climate briefing as part of the Plan Team meetings to help inform this section	High
7. CCTF climate report(s) can be used to periodically update this information through producing synthesis sections for each species as well as the ecosystem as a whole.	Medium (will take coordination to draft and dedicated resources)

Near term on ramps:

Possible JPT recommendation for WG coming out of NovPT

	section (e.g., in the ecosystem section)	
4.	SAFE Chapters (each species individual assessment) could include climate change information	Medium
a.	Species specific climate change paragraph in each safe chapter	Medium
b.	Each stock assessment chapter could include a climate change information section or slightly modified ESP	
c.	Risk, vulnerability (and adaptation potential) table	
d.	Safe author survey of climate readiness of each stock (based on their opinion and set criteria for climate readiness)	

Knowledge base Ranking

Ranking	Description	Section 3 Specific Details
1. Not Ready	Climate information and knowledge not included	Climate information is present in the knowledge base but is not discussed or utilized in the management/decision-making process.
2, On the way to climate ready	Some climate variability information and knowledge mentioned sporadically but not substantively/formally discussed or utilized	Climate variability information is present in the knowledge base and may be mentioned sporadically but is not substantively discussed nor utilized in management/decision-making processes.
3. Somewhat ready	Some information and knowledge relating to climate change discussed formally in process but not explicitly utilized in management/decision-making	Climate change information is present in the knowledge base and discussed informally and formally in the process but does not figure explicitly in management and decision-making.
4. Nearly ready	Significant level of climate change information and knowledge included for context	Significant amounts of climate information are present in the knowledge base and discussed explicitly/ formally in the management/ decision-making process in an informing-manner, but are not used to direct and adjust management actions and decisions.
5. Climate ready	Process for significant and meaningful climate change information and knowledge input is in place and operational	Climate information is present in the knowledge base and discussed explicitly/formally in the management/decision-making process in both an informing and action/decision-directing manner.



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Table 32
subsection ranking

Sub-Section	Ranking	Details
Indigenous Community Knowledge Integration	1	Community knowledge is expansive and contains detailed information about changes and impacts. There is not a meaningful system of on-ramps for this knowledge to systematically enter into NPFMC/NMFS management and decision-making processes, and lack of sufficient collaborative engagement from research and management to bring together other information with community information.
Industry Knowledge Integration	2-3	Fishery dependent information is included in stock assessments and industry representatives participate in the Plan Team and Council processes to offer their insights and fishery observations. While much of this is qualitative it is explicitly incorporated into the management process.
Agency (Council, NMFS) Knowledge Integration	2-3	See rankings in Sections 1 & 2, as well as discussion of unique climate-relevant functions of various Council bodies below in Section 3.5. With regard to the latter, most higher-ranking activities most likely occur within the Ecosystem Committee, while an overall assessment of other activities would be lower ranking.
Other Knowledge Bases Integration	1-2	There are no distinct on-ramps currently available for the diversity of “other” knowledge bases described here other than through invited presentations, stakeholder testimony, or being indirectly brought into the process via other mechanisms (e.g., analyses). See Section 3.6 Gaps and Next Steps for recommendations regarding assessing the level of how these knowledge bases are incorporated into the process.

Near term steps:

- Provide input into the **Research Priority setting process** foregrounding the importance of diverse sources of climate information and their relationship to climate-ready fisheries science and management
- **Test mechanisms within the CCTF** (e.g., Climate Briefings, Ecosystem Matrix tool, etc.) for bringing **diverse knowledge sources related to climate change into the Council process**
- Work on marine planning and protections that are equitable and inclusive of a diverse set of communities, people, knowledges, methodologies, and values
- Implement a number of the CEC Final Report (NPFMC 2021) recommendations which could increase the flow of diverse sources of climate change information (including resilience tools) into the Council process. [listed in document]
- **Increased uptake of broader climate change knowledge base not, or not fully, integrated into the Council process through exploring collaborations, partnerships and co-production**
- Conduct an analysis of Council documents to explore whether and how the climate-relevant information from a variety of 'other' knowledge bases are currently making their way into the Council process



Climate Readiness Synthesis

Section	Ranking	Description	Section Specific Details
Section 1: Management System	2	Implicit climate <u>variability</u> information associated with some management measures	Conceptually climate information informs management measure but is not directly implemented
Section 2: SAFE Reports	3	Somewhat ready	Climate and ecological information are included in the assessment, but climate change information is implicit (not explicitly discussed) in the assessment model, text, or advice.
Section 3: Knowledge Base Integration	2	Ranking depends on which knowledge base is being referred to. Overall, there are limited pathways for such information into management and decision-making.	Management measures include some/limited information from various knowledge bases and not others, though few are formally/explicitly informing, guiding, and directing actions and decisions. Integration into the NPFMC/NMFS system of information from the knowledge base of Indigenous communities is extremely limited; integration into the system from industry, agency, and other knowledge bases is a bit higher in general.



Work Plan 2022-2023[priorities]

1. Address Council comments on CRS [Oct -Nov]
 - a. finalize and post to Council website (glossy version for posting and cross-referencing)[Dec 2022]
2. Consider means to incorporate additional knowledge sources into Council research priorities [Feb]
3. Case study development (based on those explored in the CRS, e.g., herring closure area, 2 million MT cap, etc)
 - a. Possible stakeholder workshops/CCTF meeting
 - b. Use these to populate and build out the climate readiness toolbox (online database of climate informed measures)
 - c. Develop metrics to evaluate effectiveness at addressing climate change risk/adaptation
4. Scope resources to support post-doc/contractor(s) to advance CCTF and Council (climate) products (funding, fellowships, NOAA LANTERN, etc).



Summary and next steps

The CCTF has made considerable progress and the CCTF workplan is often referenced and cited at national meetings and workshops as an example of how to build a process to incorporate climate change information into management.

The Climate Readiness Synthesis Report represents a major milestone and is the first of its kind for fisheries management/Councils.

- Going forward: workshops and work sessions to develop case studies and toolbox and work to implement "near-term" options outlined in the CRS report; possibly update CRS next year at this time.
- Drafting begins for the longer Climate Change Report
- Present products to the Council annually





Thank you!!!

