



**Climate, Ecosystems,
& Fisheries Initiative**

CEFI Decision Support System

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Climate Scenario Planning Workshop

Kodiak, AK, June 2024



Urgent need for climate-informed advice (*& scenario planning*)



Fisheries:

- How are changing oceans impacting stocks, fisheries and fishing communities?
- What are expected future impacts & risks?
- What are the best strategies for changing conditions?

Protected Resources:

- What are best conservation strategies for changing ecosystems?

Aquaculture:

- What are the best strategies for siting & operations?

Coastal Communities:

- What prepare for and how adapt?

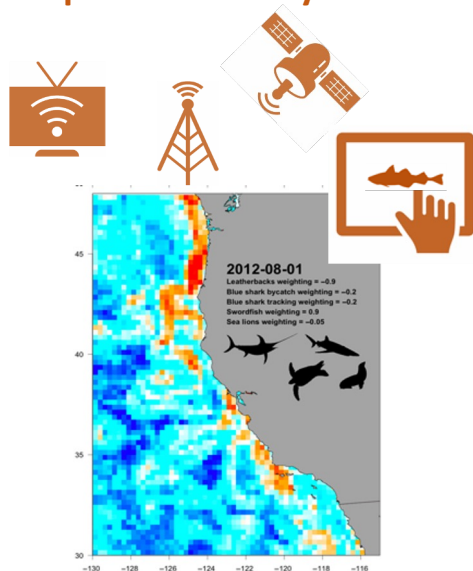
Need climate informed advice across time scales

Rapid response



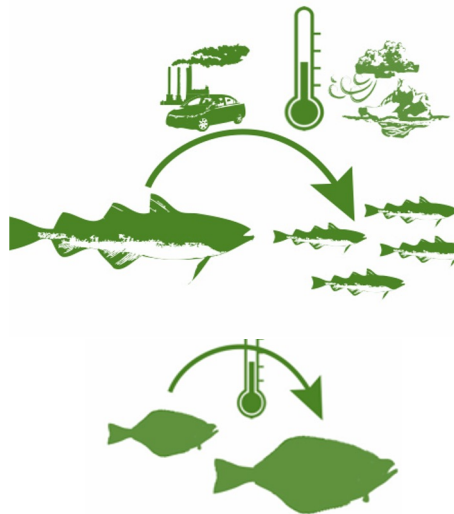
Long-term planning

Climate-linked real-time species maps to reduce by-catch



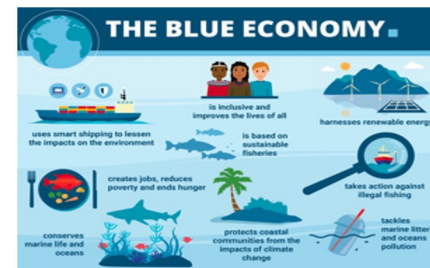
Hazen et al. 2019
<https://advances.sciencemag.org/content/4/5/eaar3001>

Climate-enhanced stock assessments to prevent overfishing



Hollowed et al. 2020 (ACLIM)

Climate-smart strategies for multi-level adaptation



www.blueeconomyconference.go.ke

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

CEFI ...

Is a cross-NOAA effort to provide climate-informed advice for marine resource management and community adaptation.

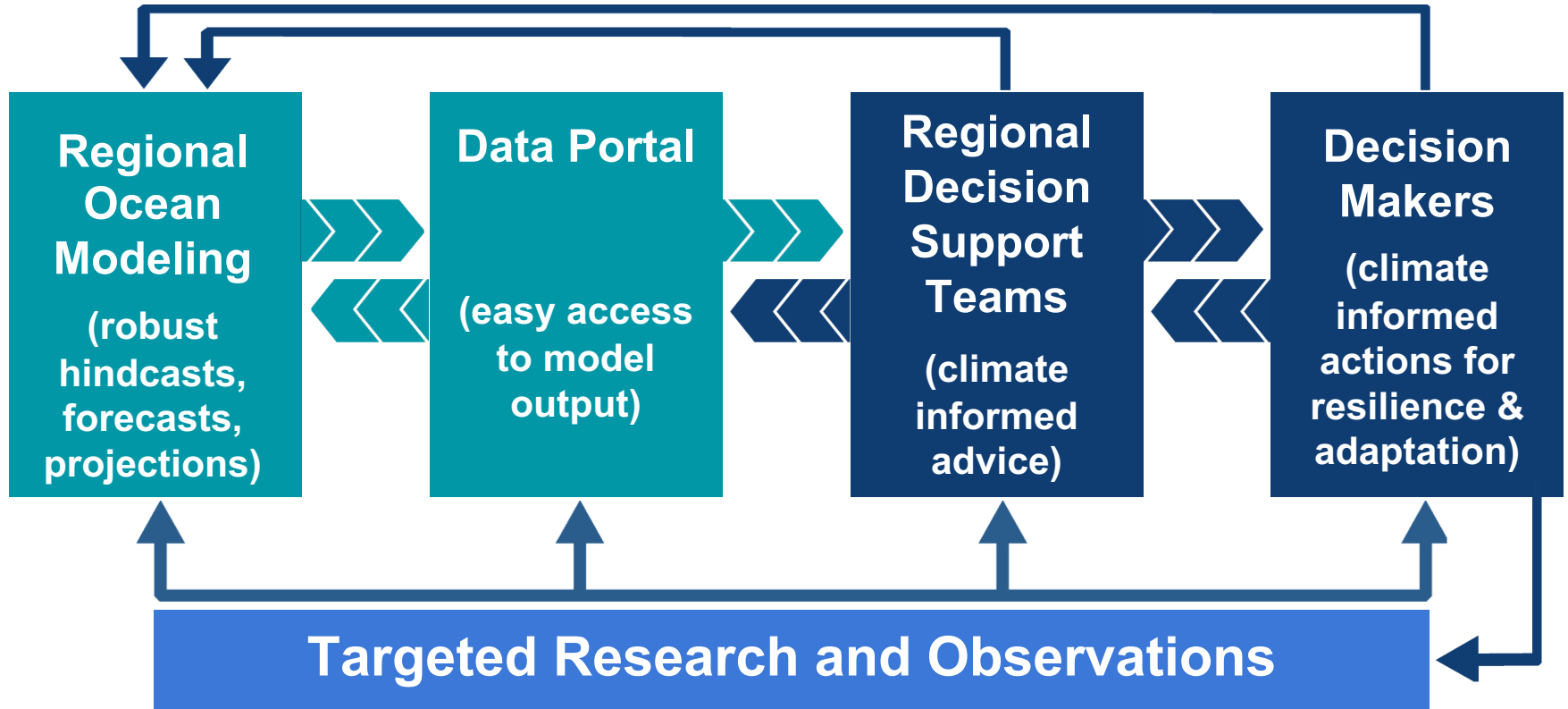
Builds on NOAA investments in research, modeling, and decision-making.

Is an end-to-end decision support system to address four requirements:

1. **Reliable delivery** of robust ocean forecasts and projections.
2. **Operational production** of climate-informed advice (scenario planning, ecological outlooks, risk assessments, management & adaptation strategies).
3. **Increased capacity** for climate-informed decision-making.
4. **Research & observations** for validation & innovation.



CEFI Decision Support System

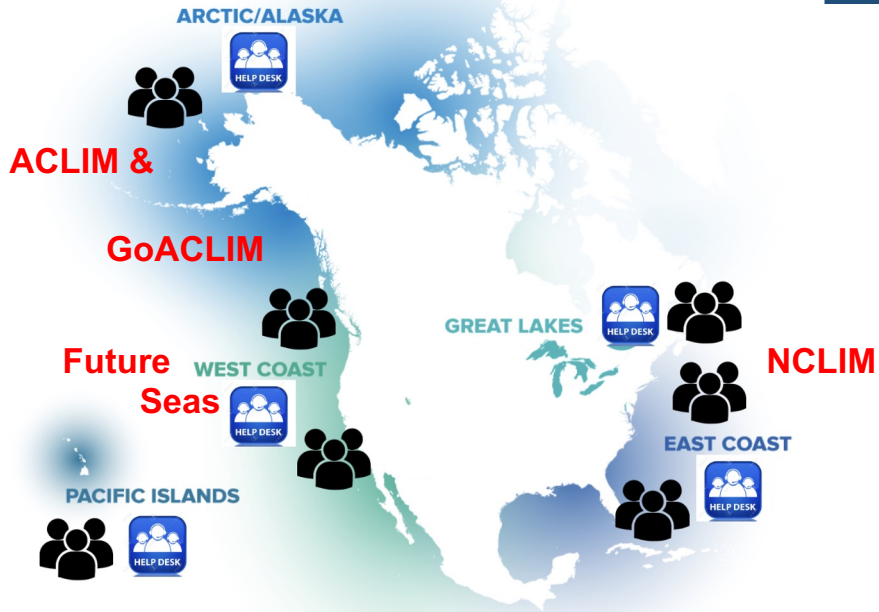


CEFI System - Regional Components

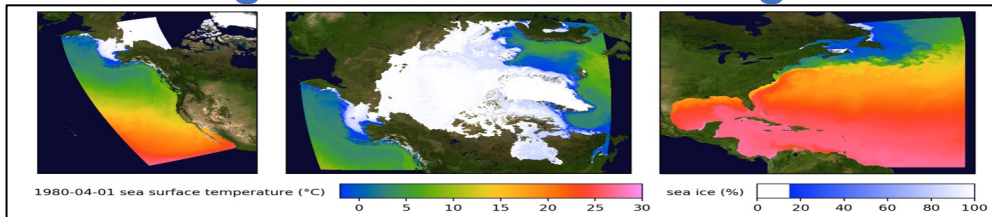
2. Regional Ocean Modeling Teams



Customize regional ocean outlooks for Decision Support Teams & other users (2 person team in each region)



1. Regional Ocean Modeling Grids



3. Regional Decision Support Teams



Produce socio-ecological outlooks & advice for decision makers (4 person team in each region)

What will CEFI do?

CEFI will enable NOAA Fisheries to provide decision-makers with climate-related information and advice such as ...

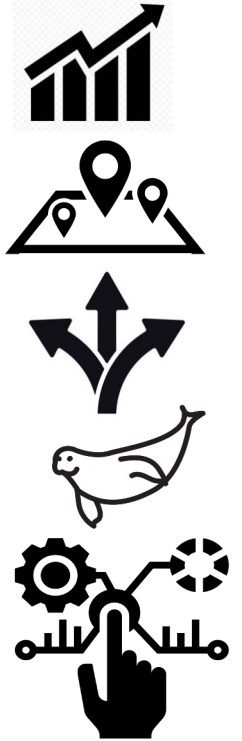
- *Early warnings of extreme events (e.g., marine heat waves)*
- *Seasonal, annual & decadal projections of future ocean ecosystem conditions (e.g., species distribution and abundance)*
- *Scenario planning & risk assessments*
- *Evaluation of best management & adaptation strategies*

... to help sustain fisheries and fishing communities in a rapidly changing climate.



What would this look like this region?

- **Robust hindcasts, forecasts and projections** of expected future ocean and ecosystem conditions...
- **Predictions of likely species distributions** under future warming scenarios...
- **Scenario analyses and management strategy evaluations** for key species...
- **Evaluation of protected species foraging areas** under future warming scenarios...
- **Easy access to information and advice** via interactive and web based tools...





ACLIM3 Decision Support System

Partnership building & scenario discussions



Climate Scenarios
Multiple ESMS

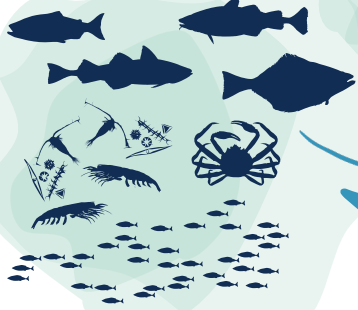


Climate Integrated Assessments
Climate Smart HCRs
Climate Informed BRPs

Fishing & harvest Scenarios
Climate Informed Policies



Alternative Food Web
& Climate Coupling



Distribution
Biomass



ABC

Bycatch

Catch

Wellbeing



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Food Security

- ▲ Carrying Capacity
- ▲ Distribution
- ▲ Biomass
- ▲ Fish Condition

- ▲ Catch
- ▲ Value
- ▲ Cost
- ▲ Wellbeing

PROJECTIONS

Species distribution & biomass

ADVICE

CI harvest recommendation

TOOL BOX
CI mart tools

RISK ASSESSMENT
Risk & Adaptation



Decision Support & Adaptation Planning
Community-determined decision-making support



EBS Snow crab rebuilding plan: climate change attribution

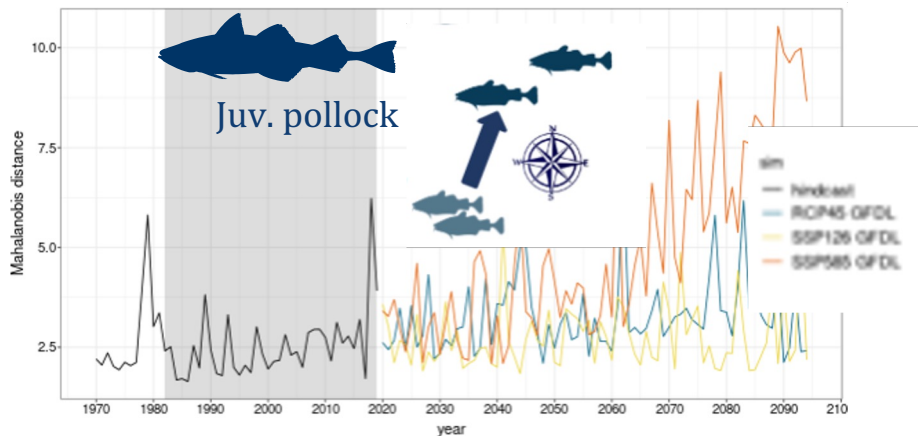
Rebuilding Plan for Eastern Bering Sea Snow Crab Final Action Analysis

August 2023

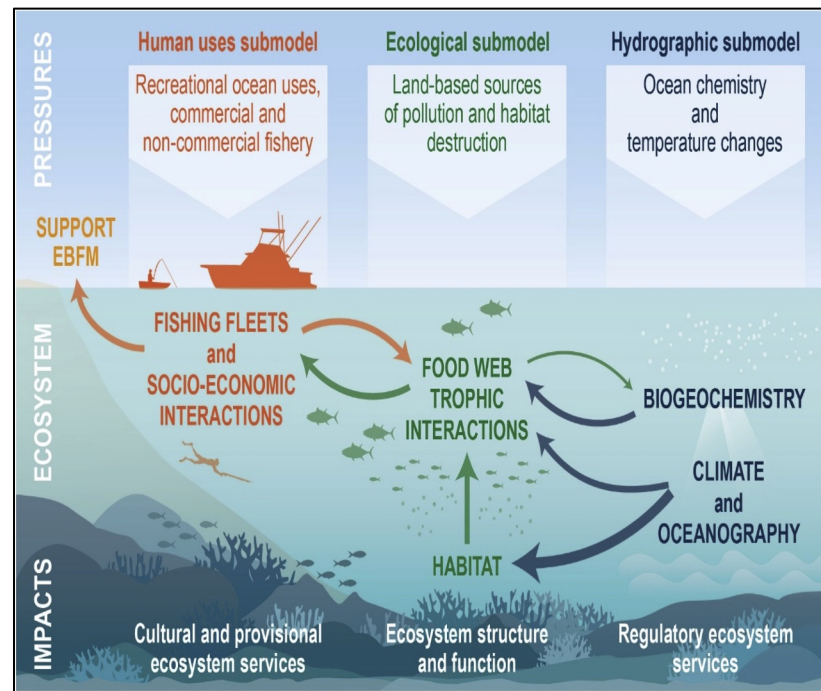


<https://www.fisheries.noaa.gov/s3/2023-12/508-Snow-Crab-Rebuilding-Analysis-Final.pdf>

Shifting distributions



How does climate impact aggregate yield across species?



In summary...

- ***CEFI is a cross-NOAA effort to provide climate-informed advice*** for marine resource management and community adaptation.
- ***We are building-out the initial CEFI Decision Support System in each region*** now with IRA funding (\$40M across NMFS, OAR & NOS).
- ***Each region will implement demonstration projects*** to meet decision maker needs over the next three years building on existing efforts.
- ***The AK region has a strong foundation to build on*** given the proactive work of the Council, AFSC, AKRO, and partners (e.g., ACLIM & GOACLIM projects).
- ***This workshop is a good example of how the AK region is leading the way*** on fisheries resilience and adaptation.





Climate, Ecosystems, & Fisheries Initiative

Thank you

For more information see the [NOAA CEFI website](#)