



2.14 Climate change regional action plan

The Western Regional Action Plan (WRAP): a component of the NMFS Climate Science Strategy

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NOAA
FISHERIES

TOR questions addressed:

2. Do ecosystem-related science programs address the priority needs of the Regional Offices and other partners?
3. Does the Regional Action Plan identify the major climate threats to the ecosystem and integrate this information into management advice?
6. Is the Center's oceanographic, habitat, climate and ecological advice sufficiently included into living marine resource management advice?

NMFS Climate Science Strategy (NCSS)

WHY

Growing demands and requirements for climate-related information.

GOAL

Increase the production, delivery, and use of climate-related information to support agency and stakeholder decisions.

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WRAP

Conforms to the national framework, identifies strengths, weaknesses, priorities, and actions to implement the Strategy on the West Coast over the next 3-5 years

NCSS Objectives

Management

1. Identify appropriate, **climate-informed reference points** for managing LMRs.
2. Identify **robust strategies** for managing LMRs under changing climate conditions.
3. Design **adaptive decision** processes that can incorporate and respond to changing climate conditions.

Science

4. Identify **future states** of marine, coastal, and freshwater ecosystems, LMRs, and LMR-dependent human communities in a changing climate.
5. Identify the **mechanisms** of climate effects on ecosystems, LMRs, and LMR dependent human communities.
6. Track **trends** in ecosystems, LMRs, and LMR-dependent human communities and provide early warning of change.
7. Build and maintain the **science infrastructure** needed to fulfill NOAA Fisheries mandates under changing climate conditions.

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Objectives

Climate-Informed
Reference Points

Robust Management Strategies

Adaptive Management Processes

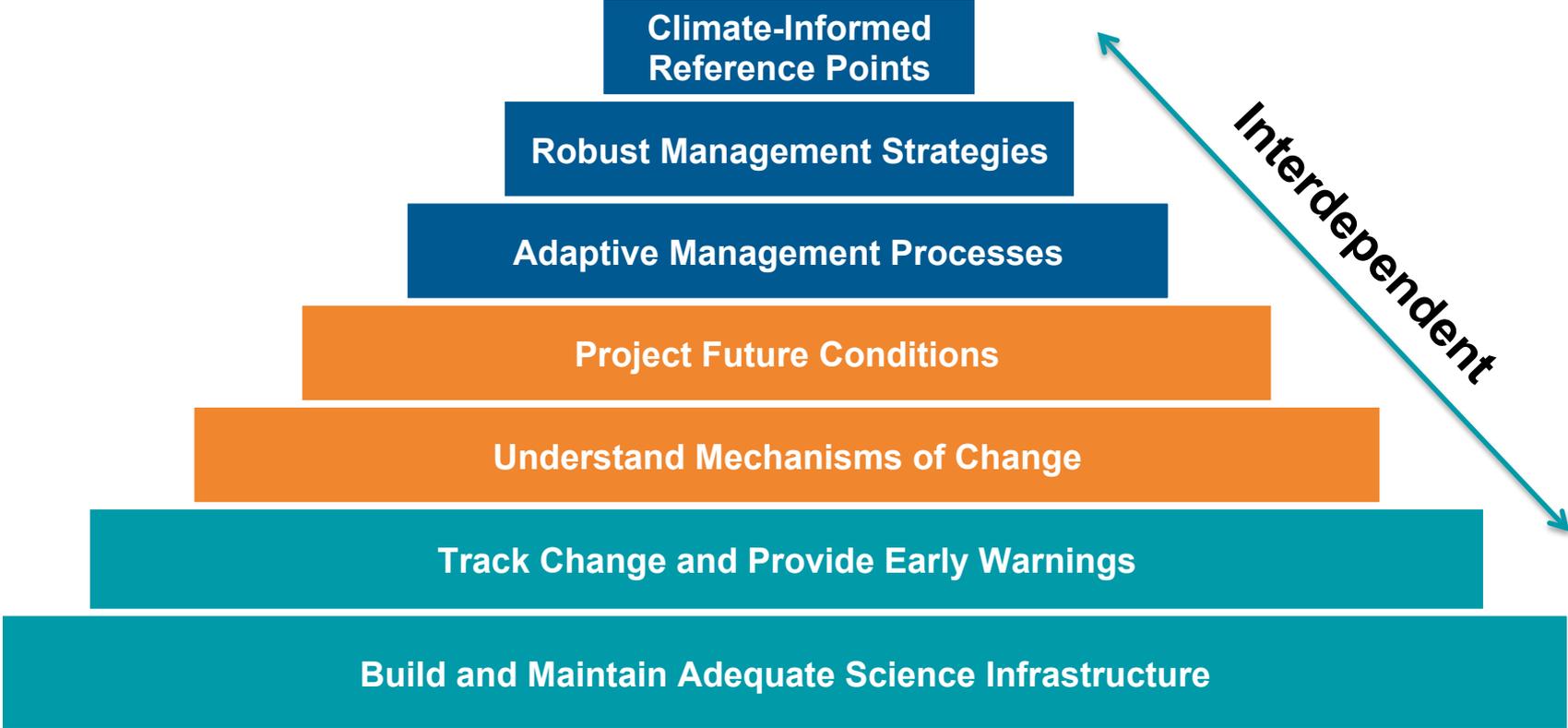
Project Future Conditions

Understand Mechanisms of Change

Track Change and Provide Early Warnings

Build and Maintain Adequate Science Infrastructure

Interdependent



Action Plan: Establish a NMFS West Coast Climate Committee and Program

Oversight of the many ongoing climate activities:

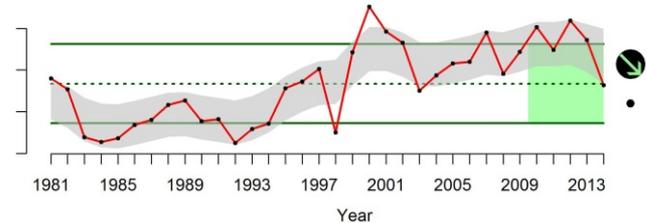
- Coordinate science activities
- Integrate modeling activities
- Sustain discussions on West Coast climate-related changes
- Refine approaches to quantifying climate-related signals, and evaluate tools and products to achieve management actions



Action Plan: Continue CCIEA development

- The science tool for implementing ecosystem-based fisheries management
- Supports multi-sector ecosystem based management
- Full implementation of the CCIEA will require research and modeling to understand the potential impacts of climate change on food chain structure, fisheries, protected species, ecosystem services, tourism, and coastal communities

Trends and advance warning?



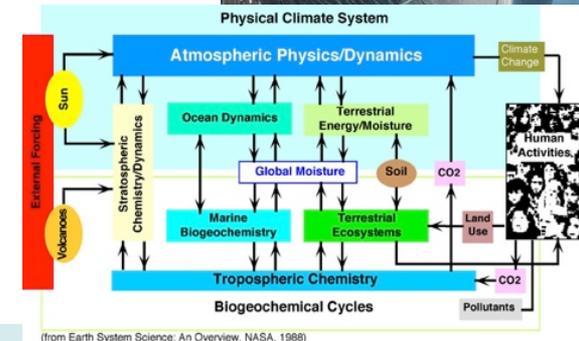
NOAA's California Current

Integrated Ecosystem Assessment



Action Plan: Sustain scientific expertise

- Promote modeling capability to address the ongoing and expected changes in climate forcing on the CCLME
- West Coast fisheries climate change vulnerability assessment will help to highlight priorities and identify key knowledge gaps around expected climate change impacts



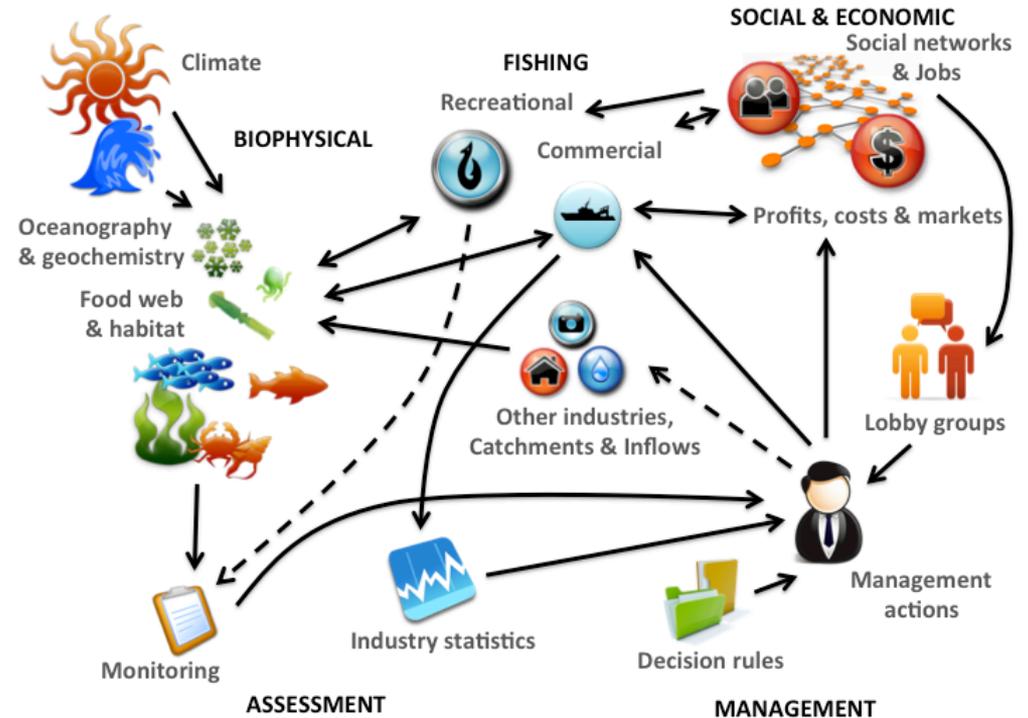
Action Plan: Review, coordinate and standardize existing observational efforts

- Consider different survey approaches
- Determine staffing needs
- Measure the physical and biological environments in more detail to better understand our changing environment and the response of species and populations for which we are responsible.



Action Plan: Conduct Management Strategy Evaluations (MSE)

- Initial projects on Pacific hake, sablefish, and North Pacific albacore for MSEs with a focus on identifying mechanistic links, improving management strategies, and developing climate-informed reference points
- Include multi-species and multi-fleet economic models



Action Plan: Disseminate new climate-related living marine resources science and information through existing U.S. West Coast NOAA Fisheries communications efforts

- Our team will assist in delivering this information effectively to target audiences by partnering with active climate science communities



Immediate Next Steps

- Execute(d) a WRAP roll-out plan beginning in mid-April
- Draft WRAP is in circulation for external review
 - PFMC and Ecosystem review panels starting in April
 - NW and SW Centers to circulate to other key constituents and circulate within respective Science Centers
- Evaluate comments and generate final WRAP in August/September
- Submit completed WRAP to HQ by 1 October 2016

West Coast Strengths

- Existing observations and time series
- CCIEA is addressing science issues
- Studies underway for addressing and/or incorporating climate drivers
- Strong collaborations and relationships



West Coast Challenges

- Initiatives identified that require incremental funding increases
 - WRAP identifies areas where increased funding would help resolve existing gaps in Center capabilities
- Infrastructure
 - Current workforce is already dealing with climate variability, little capacity for increased effort or filling gaps,
 - Observational strategies must be reviewed for increased efficiencies without losing critical capabilities
 - Laboratories may need to be repurposed for new technologies and directions
- Predictive modeling capacity
- Social Science capacity



West Coast Strategies

- West Coast climate program development
- Consider workforce realignment to confront change
- Laboratory experiments to quantify climate change impacts on organisms
- Determine appropriate scales for science and management
- Evaluate surveys: integrate, standardize, identify gaps
- Indicator development
- Sustain time series
- Increase forecast modeling capacity
- Meet the needs of policy-makers and managers



Questions?

Figure 1. Average Global Sea Surface Temperature, 1880–2014

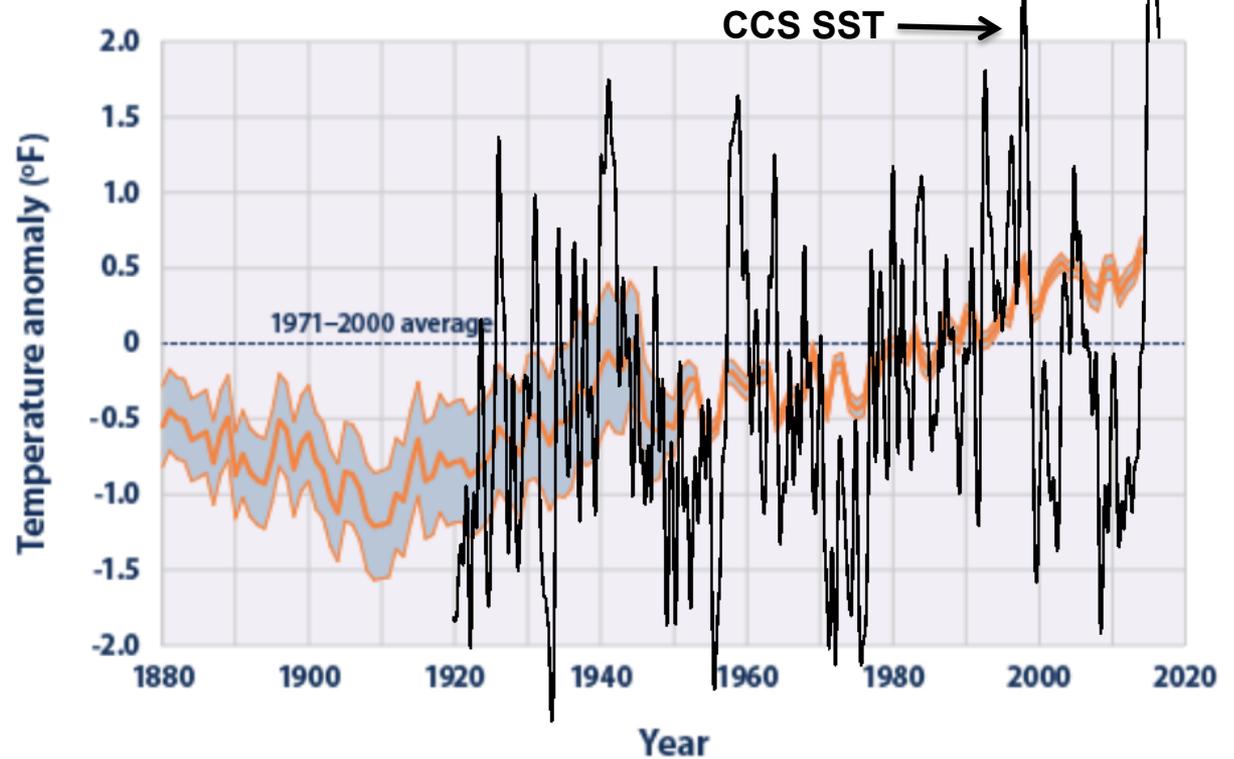


Figure from Paul Fiedler