National Climate Assessment

U.S. Global Change Research Program

The National Climate Assessment

Snowmass, Colorado

August 1, 2011

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Office of Science and Technology Policy

http://assessment.globalchange.gov

A New Vision and Mission for USGCRP's 10 Year Strategic Plan:

- **Vision**: "A nation, globally engaged and guided by science, meeting the challenges of climate and global change"

- **Mission:** "To build a knowledge base that informs human responses to climate and global change through coordinated and integrated federal programs of research, education, communication, and decision support"

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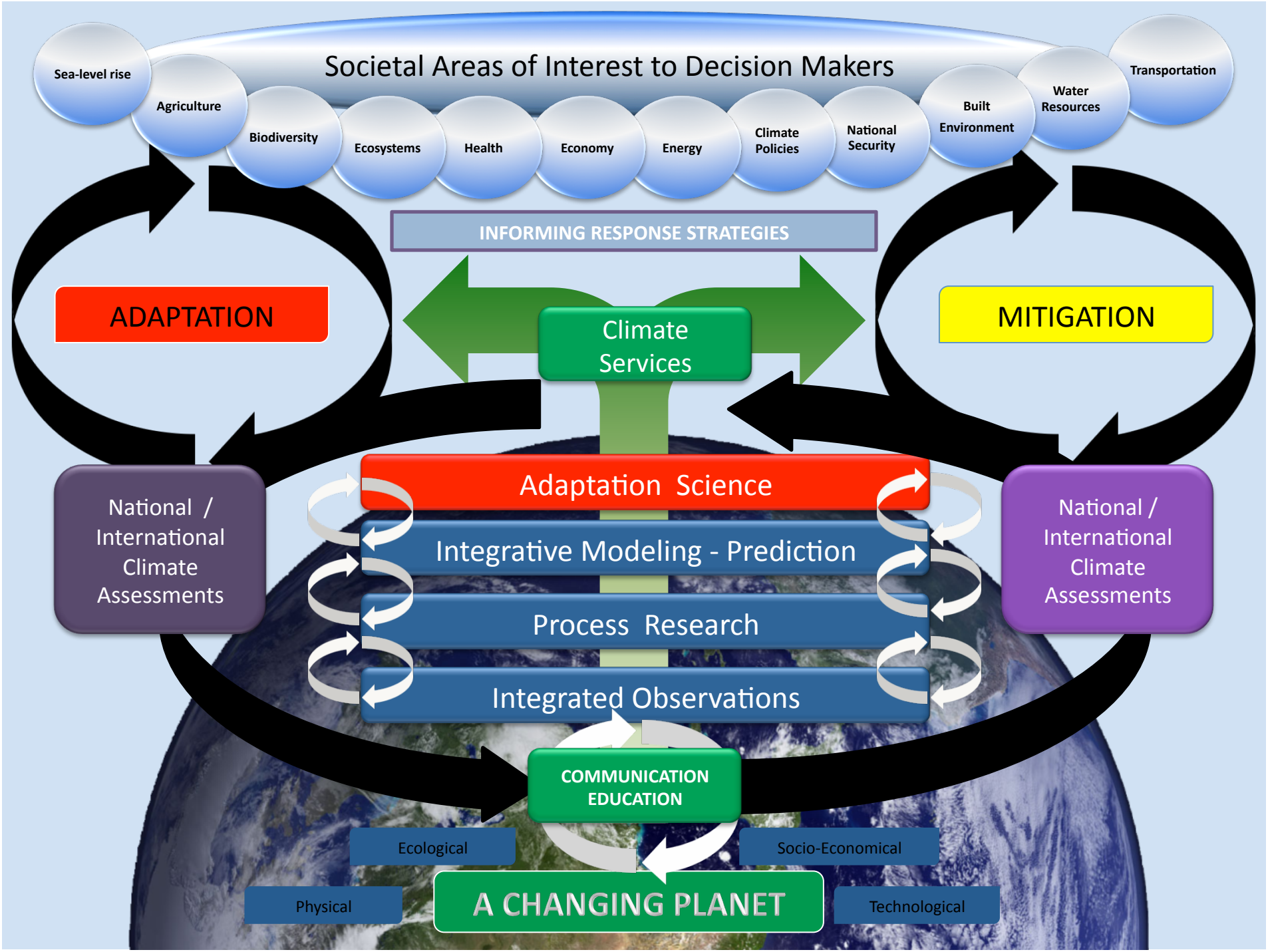
Societal Areas of Interest to Decision Makers
Sea-level rise
Agriculture
Biodiversity
Ecosystems
Health
Economy
Energy
Climate Policies
National Security
Built Environment
Water Resources
Transportation
INFORMING RESPONSE STRATEGIES
ADAPTATION
MITIGATION
Climate Services
National / International Climate Assessments
Adaptation Science
Integrative Modeling - Prediction
Process Research
Integrated Observations
National / International Climate Assessments
COMMUNICATION EDUCATION
Ecological
Socio-Economical
Physical
A CHANGING PLANET
Technological

Uncertainties and Challenges related to Adaptation

from ACC Adapting to the Impacts of Climate Change

- Uncertainties in estimating the nature, timing and magnitude of climate impacts
- Tendency to focus on trends rather than extremes, and ignore the potential for abrupt change
- Long term, multi-generational issue: short term costs vs long term benefits?
- Attribution issues: trends vs. variability
- Political impediments
- Institutional issues, such as maladaptive policies
- Resource limitations
- Lack of data regarding costs and benefits of alternative adaptation options at multiple scales
- Lack of science translation capacity

Global Change Research Act (1990), Section 106

- **…not less frequently than every 4 years**, the Council… shall prepare… an assessment which –
  - integrates, evaluates, and interprets the findings of the Program and discusses the scientific uncertainties associated with such findings;
  - analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; and
  - analyzes current trends in global change, both human- induced and natural, and projects major trends for the subsequent 25 to 100 years.

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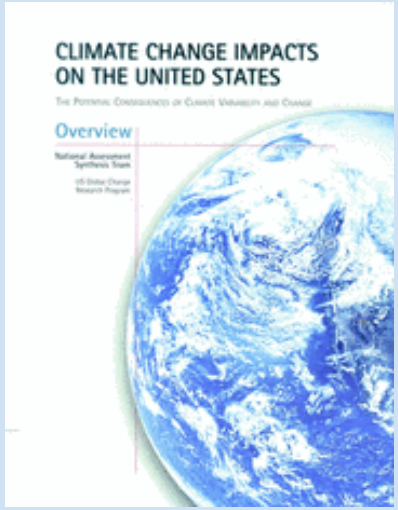
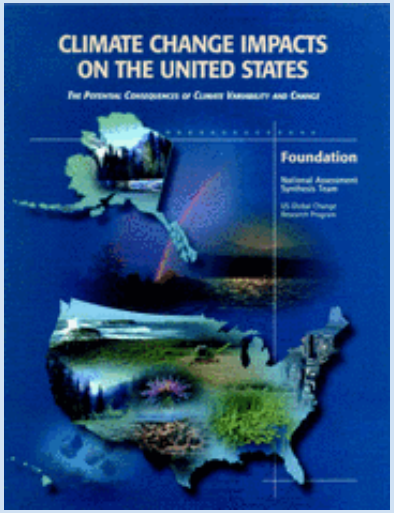
Previous National Climate Assessments

Climate Change Impacts on the United States (2000)





Climate Change Impacts in the United States (2009)

Target date for next NCA: 2013

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The Next National Climate Assessment (NCA)

- **Sustainable process** with multiple products over time
- New topics, **cross-sectoral studies**
- Consistent national matrix of **indicators**
- Central coordination, multiple **partners**
- Regional and sectoral **networks** building assessment **capacity**
- Recognizes **international context**
- Engagement and communications focus
- Web-based data and **tools for decision support**
- Process workshops to establish **methodologies**

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Process Workshops

1. Strategic Planning
2. Midwest Regional Workshops
3. Outline and Workplan
4. International Context
5. Communications
6. Knowledge Management
7. Regional and Sectoral Approach
8. Ecological Indicators
9. Scenarios
10. Modeling
11. Vulnerability Assessment
12. Valuation
13. Physical Indicators
14. Societal Indicators

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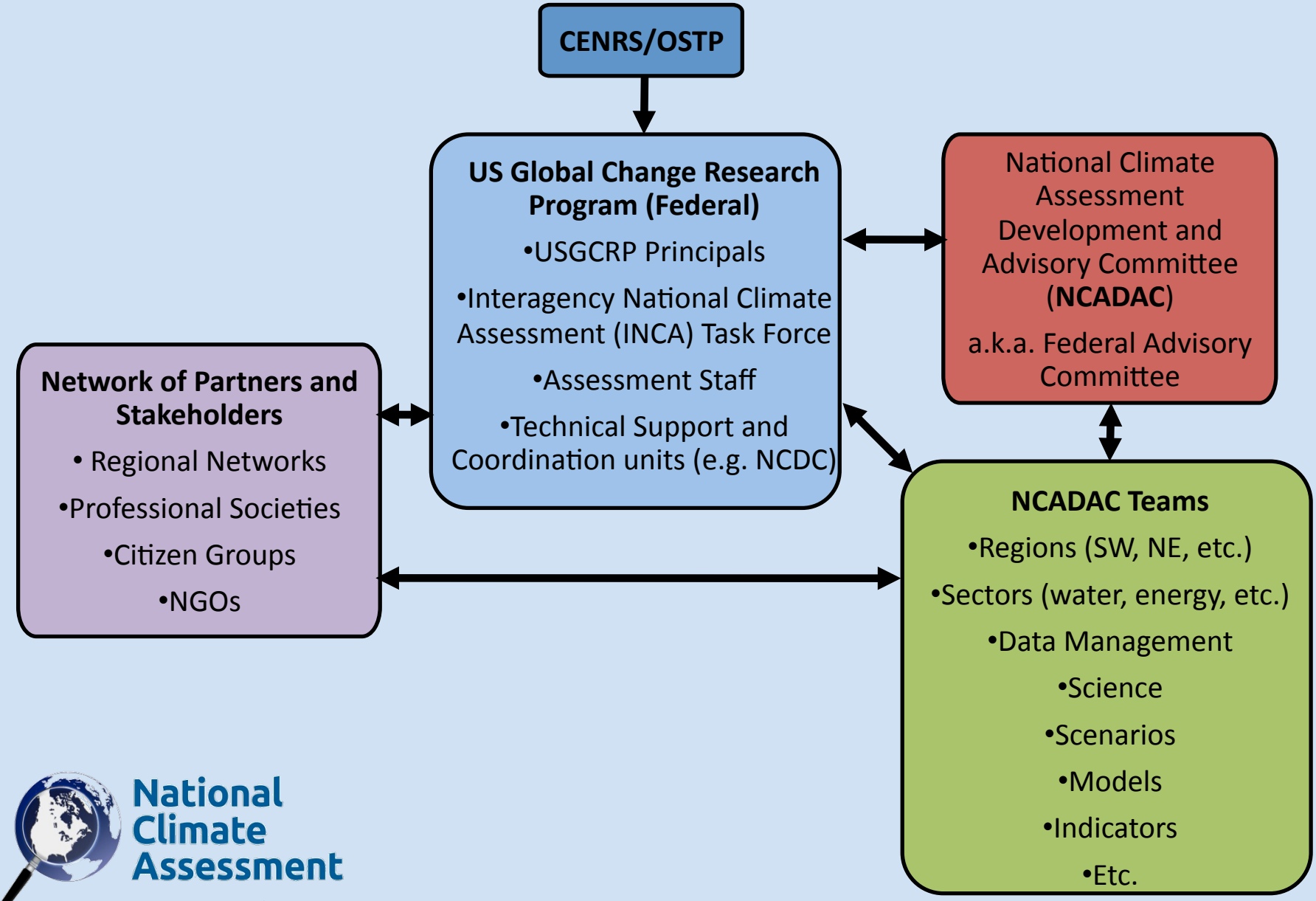
Assessment Structure



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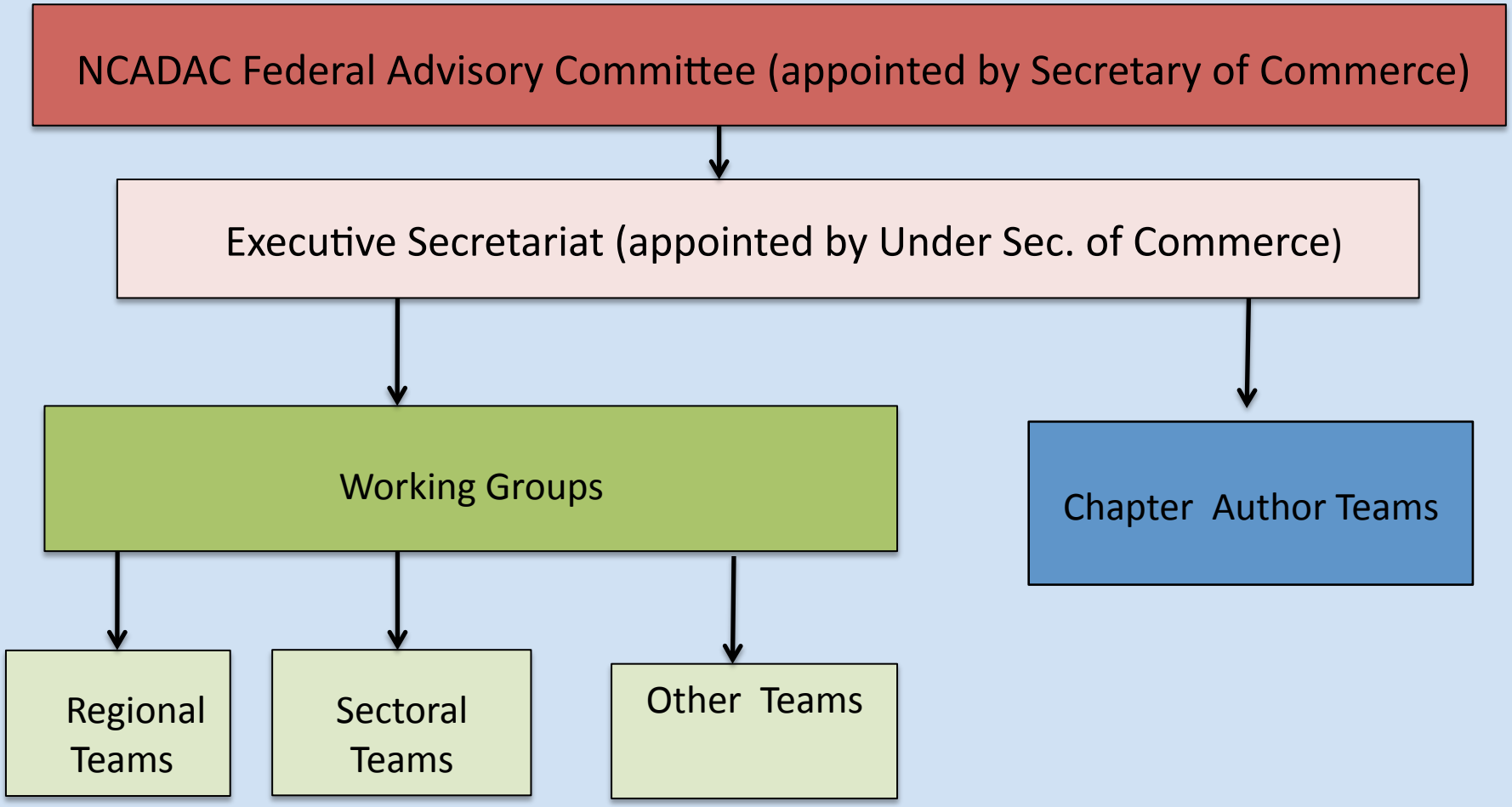
Assessment Team Structure



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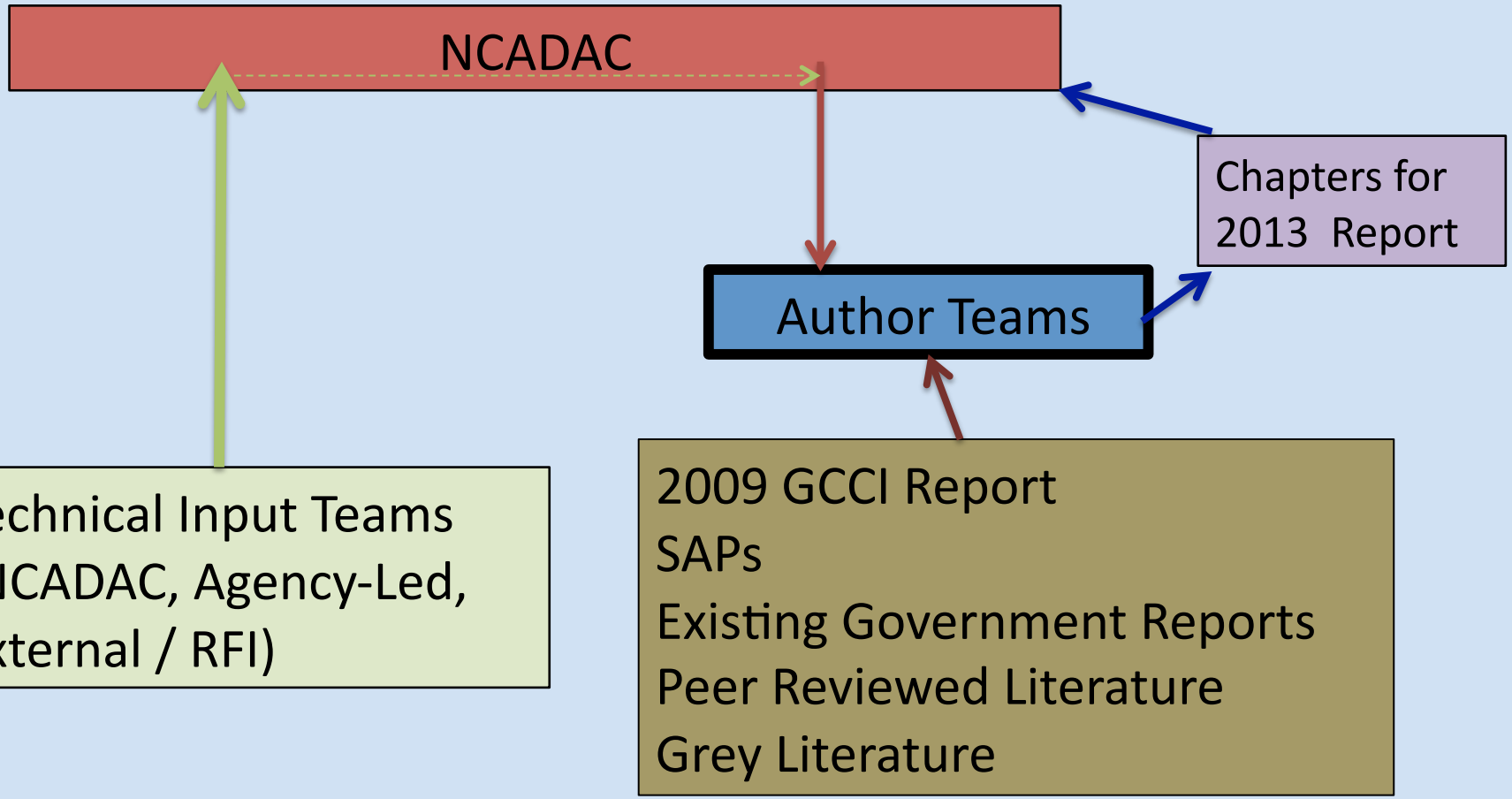
Information Flow



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Risk-Based Framing: A Point of Departure*

"Responding to climate change involves an *iterative risk management* process that includes both adaptation and mitigation and takes into account climate change damages, *co-benefits, sustainability, equity* and attitudes to risk."

Source: IPCC AR4 Synthesis Report Summary for Policymakers (2007; pg 22)

***From Gary Yohe: Preliminary Proposal for NCADAC Consideration at August Meeting**

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Criteria for Judging Key Vulnerabilities

IPCC (2007)

- magnitude,
- timing,
- persistence/reversibility,
- the potential for adaptation,
- distributional aspects,
- *likelihood*, and
- *"importance*"*

  ** Based on perceptions of relevant actors, this is not an objective measure*

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Proposed Approach to Scenarios

- A2 – high scenario and B1 low for consistency with previous work
- Four approaches:
  - Climate (climatologies and projections produced by Ken Kunkel)
  - Socioeconomic (short and long term projections of population and economic activity)
  - Sea level rise (general guidance that can be translated for regional applications)
  - Land Use (will use existing work from USGS and USFS)
- Place-based scenario planning exercises
- Criteria for use of downscaled data

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Outline for 2013 Report

- The scientific basis for climate change
- Sectors and sectoral cross-cuts
- Regions and biogeographical cross-cuts
- Mitigation and adaptation
- Agenda for climate change science
- The NCA long-term process

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Sectors

- Water resources
- Energy supply and use
- Transportation
- Agriculture
- Forestry
- Ecosystems and biodiversity (with links to ecosystems services)
- Human health

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Suggested Cross-Cutting Topics

- Water, energy, and land use
- Urban/infrastructure/vulnerability
- Impacts of climate change on tribal, indigenous, and native lands and resources
- Land use and land cover change
- Rural communities, agriculture, and development
- Impacts on biogeochemical cycles

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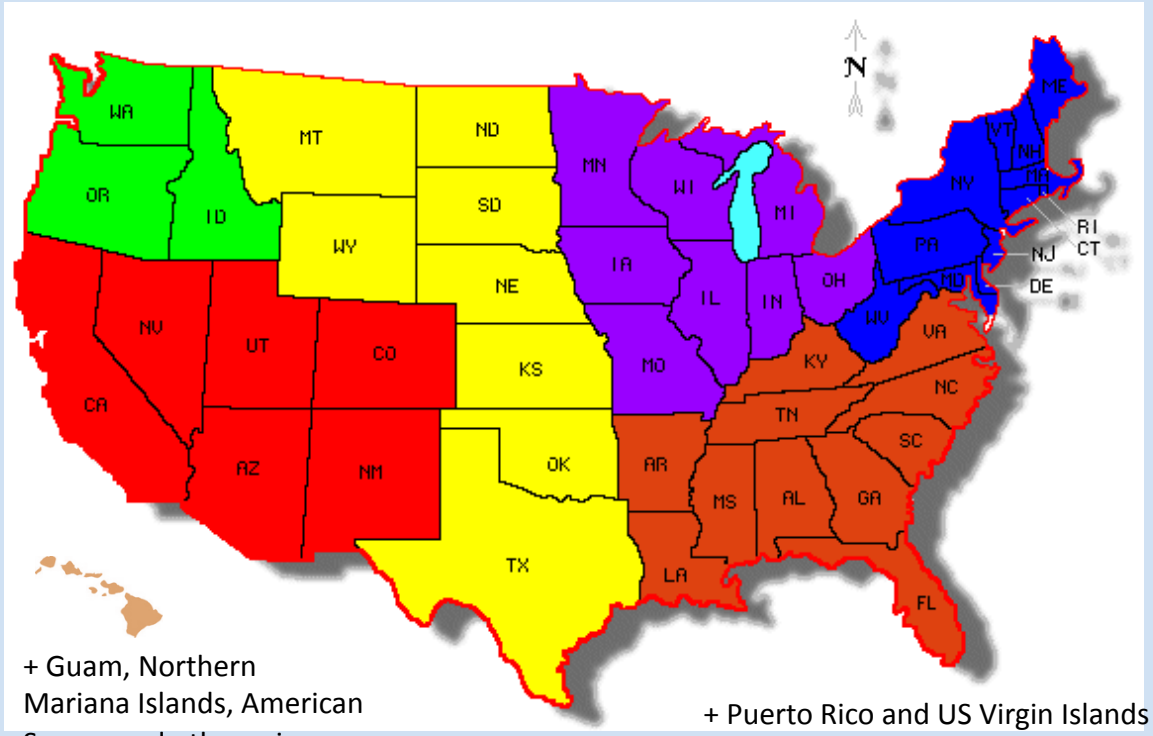
Regions

- Northeast
- Southeast and Caribbean
- Midwest
- Great Plains
- Northwest
- Southwest
- Alaska and Arctic
- Hawaii and Pacific Islands



+ Guam, Northern Mariana Islands, American Samoa and other minor outlying islands

+ Puerto Rico and US Virgin Islands

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Biogeographical Cross-Cuts

- Oceans and marine resources
- Coastal zone, development, and ecosystems, with case studies including
  - SF Bay Delta
  - Chesapeake
  - Gulf Coast
- Drainage basins, with case studies including
  - Great Lakes
  - Colorado River
  - Columbia River

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PROPOSED* NCA Uncertainty Guidance
THANKS TO RICHARD MOSS

Decision context is a game changer:

- Sound decisionmaking that anticipates, prepares for, and responds to climate change depends on information about the full range of possible consequences and associated probabilities
- The NCA must assess and communicate the state of our understanding and the level of confidence with which we can make projections of climate change and its impacts.

*** Pending approval by NCADAC**

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Design Criteria for Uncertainty Guidance

- Uncertainty guidance needs to address communications challenges associated with the use of probability statements and terms such as “probable” or “likely”
- Design criteria must be appropriate for impacts, adaptation, vulnerability assessment and US audiences
- Reflects current view of “best practice” in the decision analysis and risk communication (and behavioral research) fields
- Compatibility with IPCC approach
- Practical, easy to convey to assessment teams

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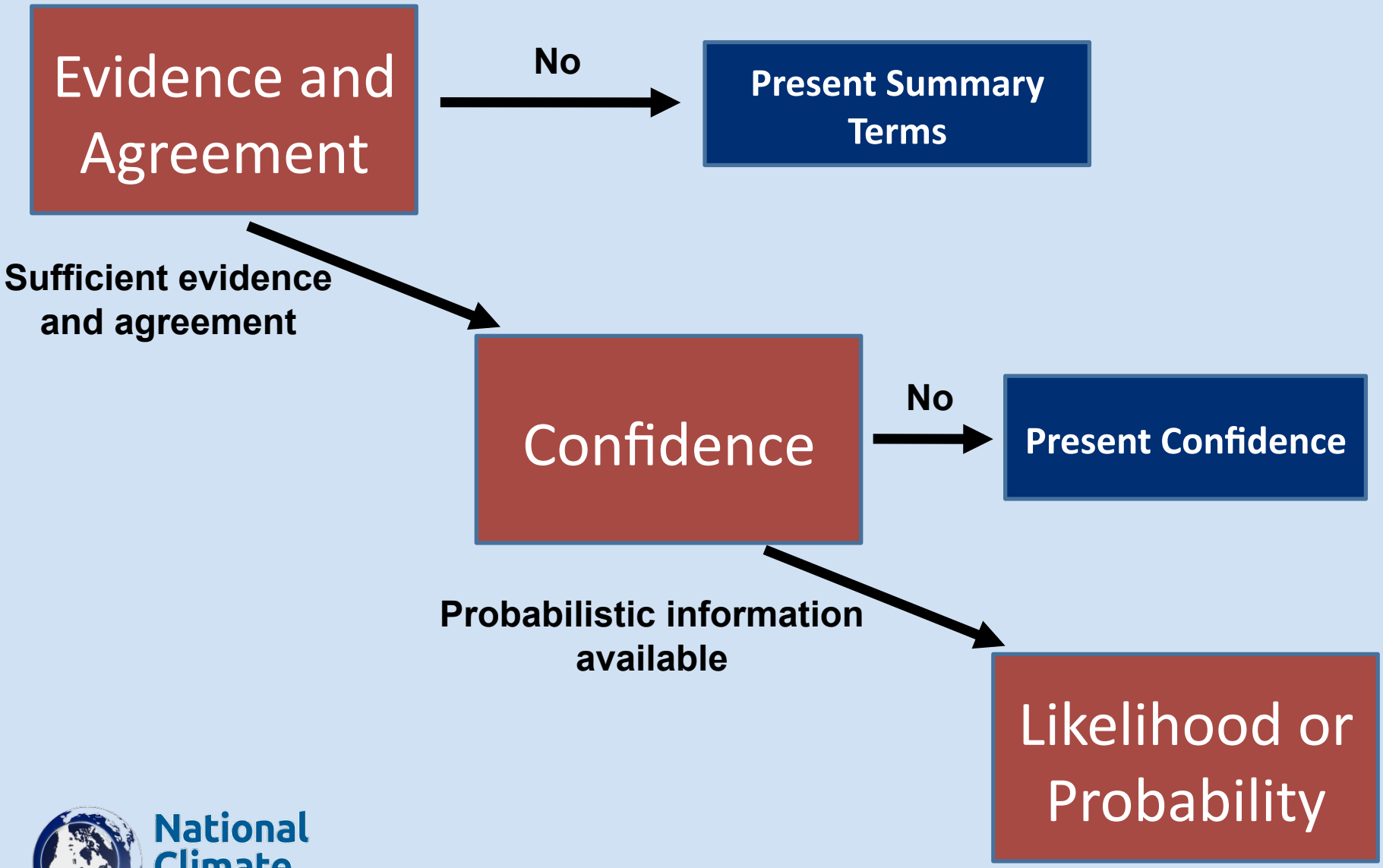
Degree of Certainty for Findings: Process



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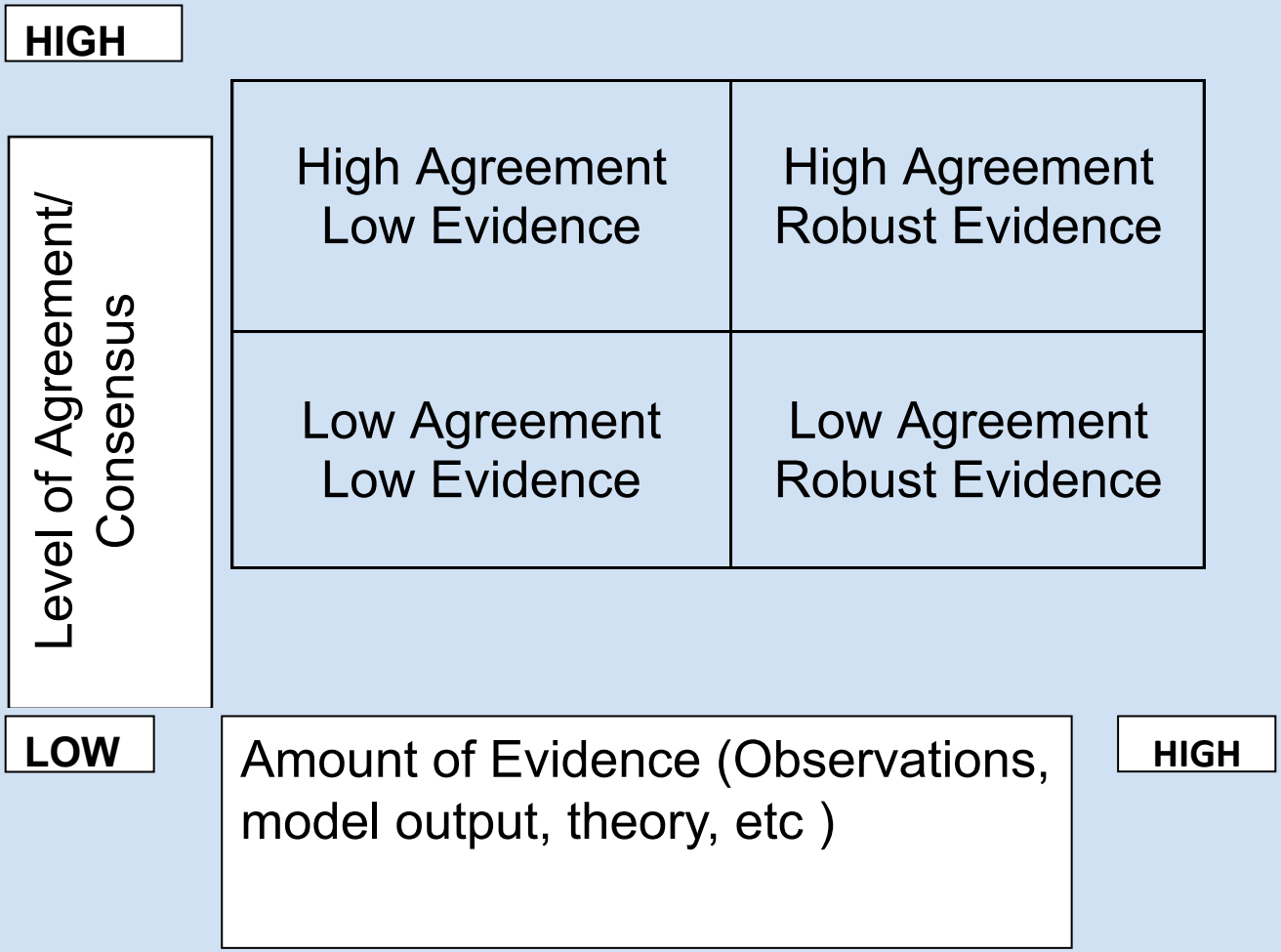
Source: Mastrandrea et al., 2010

Minimum: Evidence and Agreement
Option A: **Summary Terms**



Next Level:
Calibrated Confidence Expressions

- Interpretation: Odds that the statement/finding is true
- Use simple “betting odds” formulation, eg 9:10 likelihood the statement is correct or the outcome will occur

“Behavioural research has found that lay people can often extract the information that they need from clear numeric expressions of uncertainty, but that they struggle with the ambiguity of verbal quantifiers, such as ‘unlikely’ or ‘probable’.” Pidgeon and Fischoff (2011), Budescu and Wallsten (1995)

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When Evidence is Robust and Supports Likelihoods

- Use a quantified measure of uncertainty if at all possible
- Likelihood may be based on statistical or modeling analyses or elicitation of expert views
- Present probability distribution(s) graphically and/or provide a range of percentiles of the distribution(s)
- Do not combine likelihood and confidence statements

Likelihood Terminology if Needed

- If using likelihood terminology in a chapter or summary, use a term from this calibrated scale
- Interpretation: The described event or outcome will occur with ~X-X% likelihood (e.g., weather forecast example)

(1.00)
"Very Likely"
(0.90)

(0.90)
"Likely"
(0.67)

(0.67)
"As Likely As Not"
(0.33)

(0.33)
"Unlikely"
(0.10)

(0.10)
"Very Unlikely"
(0.00)

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Mandatory steps

- Each main conclusion should have a traceable account of how the authors reached the conclusion, eg
  - Lines of evidence used
  - Ranges of estimates in the literature
  - Degree of consistency of the evidence
  - Important assumptions
  - Standards of evidence
  - Degree of consensus
- Specify scenarios of climate change used

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Indicators for the National Assessment: Suggested Approach

Goal: Identify a relatively small number of policy-relevant, integrated indicators, designed to provide a consistent, objective, and transparent overview of major trends and variations in climate impacts.

- The indicator system should include metrics (both measured variables and/or indices) for consistently evaluating climate-related vulnerabilities and impacts over time.
- The system should help to assess progress of adaptation and mitigation activities across sectors, regions, and timeframes relative to the magnitude of climate impacts.
- To the extent feasible, Physical, Social and Ecological components should be integrated; there is a need for an overarching strategy that ties them together.

Indicators for the National Assessment: Potential Impact

- Reference points for ongoing assessment activities
- Identify status, rates of change, trends, and thresholds
  - Consideration of climate in a multi-stress context
  - Across time and space scales
- Early warning of changes in valued systems
- Improved understanding of mechanisms and implications
- Communication to the public about impacts and vulnerabilities of importance to the U.S.
- Useful in a management/policy context (e.g., adaptation), but not focused on individual decisions

Outcomes of the NCA

- **Ongoing, relevant analysis** of scientific understanding of climate change impacts, risk, and vulnerability
- Enhanced timely **access to Assessment-related data** from multiple sources
- **Systematic evaluation** of progress towards reducing risk, vulnerability, and impacts
- A **sustained process** for **informing an integrated research program**
- **Evaluation** of the implications of alternative **adaptation and mitigation policy options**
- **Information** that provides the foundation for a science-based national discourse on climate change

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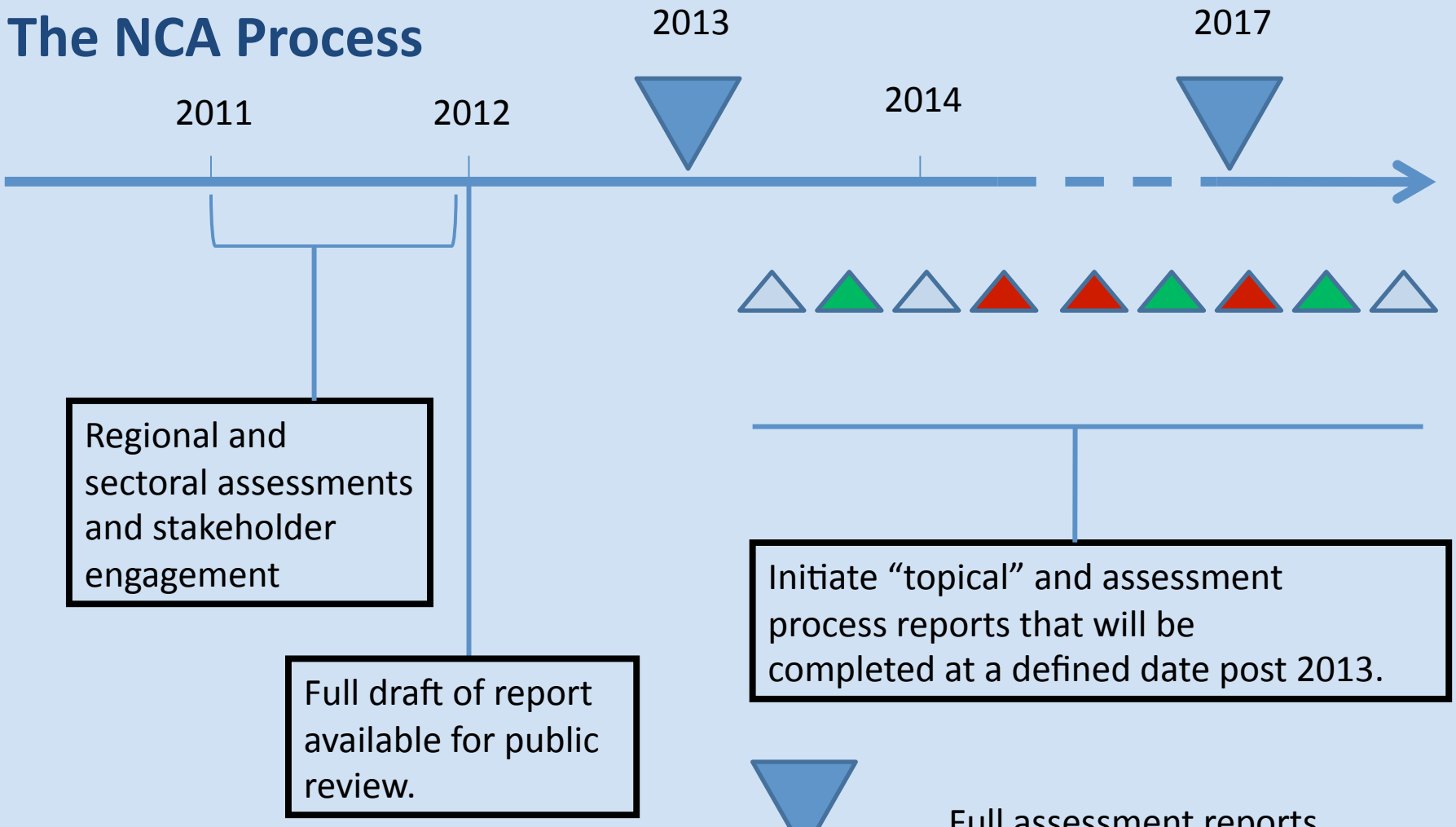
The NCA Process



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Opportunities for Participation

- Respond to the "Request for information" Federal Register Notice
  - Develop technical inputs, e.g.,
    - Literature reviews, discussion papers, and other review papers
    - Case studies
    - Modeling results, interpretation of data, topical reports
- Participate in assessment activities, e.g.,
  - Teams, meetings and workshops
  - Support indicator systems
- Become a network partner, help link the assessment activities to constituents, provide assessment capacity

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Adaptation Task Force

- Core Federal Policy Goals for Climate Change Adaptation
  - Build resilience to climate change in communities.
  - Make science more accessible to communities & decision-makers.
  - Integrate climate risk management into Federal agency planning.
  - Develop strategies to safeguard natural resources.
  - Enhance efforts to lead & support international climate adaptation

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Questions and Comments

- For more information on the National Climate Assessment, please visit: http://assessment.globalchange.gov

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