

2<sup>nd</sup> State of the Carbon Cycle Report  
(SOCCR-2)  
DRAFT

Public Comment Period  
(Nov 3, 2017 to Jan 8, 2018)  
via <https://review.globalchange.gov>

# U.S. Global Change Research Program

- The U.S. Global Change Research Program (USGCRP) began as an initiative under President Ronald Reagan in 1989
- Mandated by Congress in the Global Change Research Act of 1990 (P.L. 101-606), “to assist the Nation and the world to **understand, assess, predict** and **respond** to human-induced and natural process of global change”
- The GCRA was signed into law by President George H. W. Bush in November 1990

Through USGCRP, agencies work to:

- Coordinate global change research across the government
- Use research results and products to provide information regarding risk management in a changing climate
- Inform and deliver products mandated by the GCRA:
  - Our Changing Planet (USGCRP’s annual report to Congress)
  - Decadal strategic plan (with triennial updates)
  - National Climate Assessment (NCA)

# National Climate Assessment (NCA) mandate

*From the Global Change Research Act of 1990:*

Not less frequently than every 4 years ... shall prepare and submit to the President and Congress an assessment which:

- Integrates, evaluates, and interprets the findings ....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
- Analyzes current trends in global change, both human- induced and natural, and projects major trends for the subsequent 25 to 100 years.

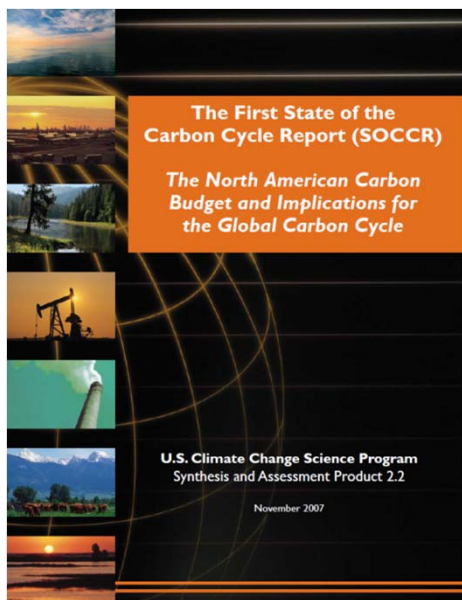
# NCA4, SOCCR-2, Global Change Research Act (GCRA)

SOCCR-2 is not NCA4 but it informs NCA4 & addresses GCRA mandated assessment topics

<p style="text-align: center;"><b>GCRA Congressional Mandate</b></p>	<p style="text-align: center;"><b>4<sup>th</sup> National Climate Assessment (NCA4)</b></p>		<p style="text-align: center;"><b>SOCCR-2</b></p>
	<p style="text-align: center;">Vol. I: Climate Science Special Report</p>	<p style="text-align: center;">Vol. II: Climate Change Impacts, Risks, and Adaptation in the U.S.</p>	<p style="text-align: center;"><b>2<sup>nd</sup> State of the Carbon Cycle Report</b></p>
<p>integrates, evaluates, and interprets the findings of the Program (USGCRP) and discusses the scientific uncertainties associated with such findings</p>	✓	✓	✓
<p>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</p>	✓	✓	✓
<p>analyzes current trends in global change, both human- induced and natural, and projects major trends for the subsequent 25 to 100 years.</p>	✓	✓	✓

# **SECOND STATE OF THE CARBON CYCLE REPORT (SOCCR-2):**

## **BACKGROUND**

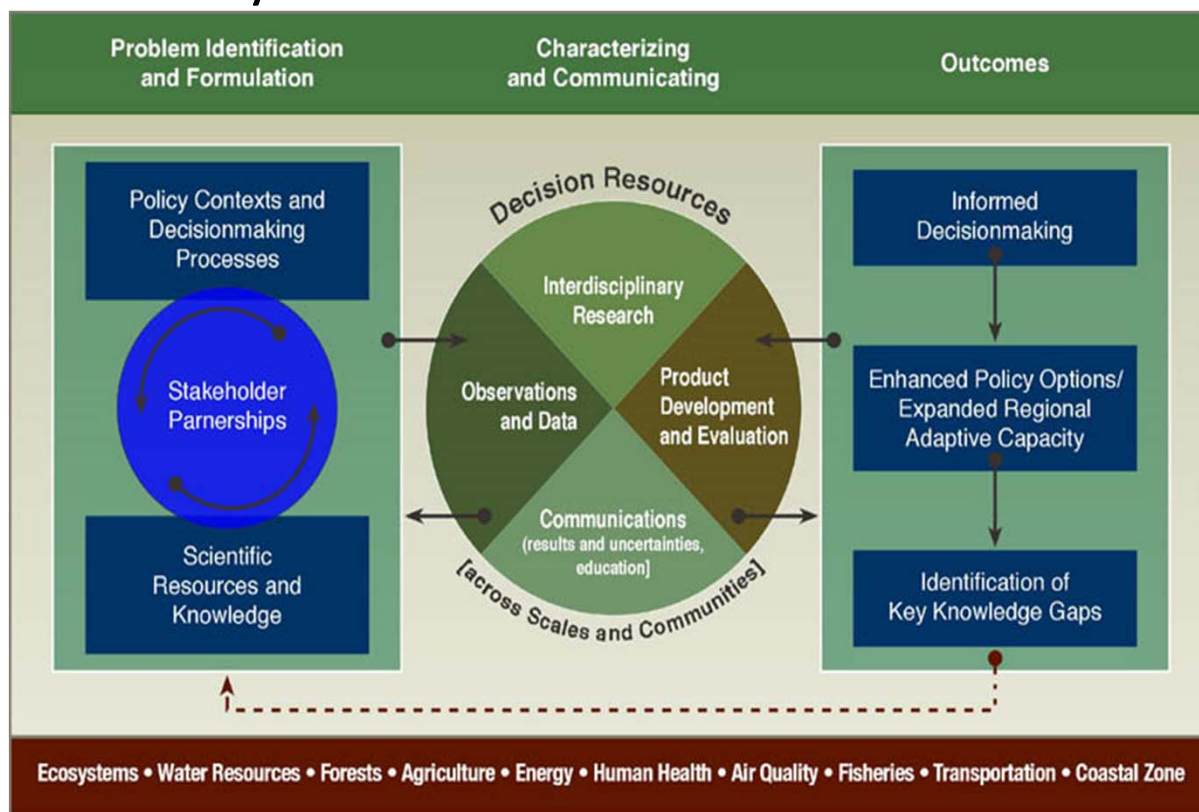


# 1<sup>st</sup> State of the Carbon Cycle Report: SOCCR-1 (2007)

- The North American Carbon Budget and Implications for the Global Carbon Cycle
- Synthesis and Assessment Product

## 2 major goals of SOCCR-1 (2007)

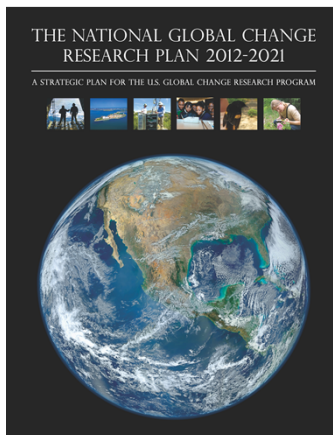
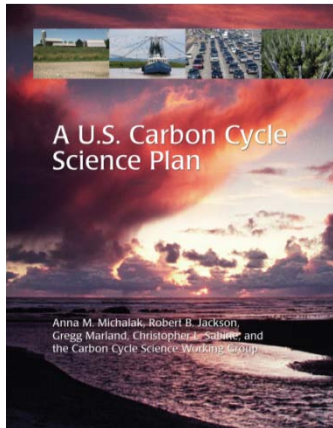
1. To summarize scientific knowledge about carbon cycle properties and changes for North America.
2. To provide scientific information for decision support and policy formulation concerning carbon.



U.S. Climate Science Program (now U.S. Global Change Research Program)  
Decision Support Strategy

# 10 years later: SOCCR-2

- Follow-up to the 1st SOCCR (2007)
- Led by Carbon Cycle Interagency Working Group (CCIWG)/ U.S. Carbon Cycle Science Program under USGCRP auspices
- Lead federal Administrative Agency is USDA.
- Focus on U.S. and North American carbon stocks and fluxes in managed and unmanaged systems
- Including relevant carbon management science perspectives and tools for supporting and informing decisions addressed in/related to U.S. Carbon Cycle Science Plan (2011), National Climate Assessment, USGCRP Strategic Plan (2012-2021) and Global Change Research Act (1990)



104 STAT. 3096

PUBLIC LAW 101-606—NOV. 16, 1990

Public Law 101-606  
101st Congress

#### An Act

To require the establishment of a United States Global Change Research Program aimed at understanding and responding to global change, including the cumulative effects of human activities and natural processes on the environment, to promote discussions toward international protocols in global change research, and for other purposes.

Nov. 16, 1990  
[S. 169]

Global Change  
Research Act  
of 1990.  
15 USC 2921  
note.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

#### SECTION 1. SHORT TITLE.

This Act may be cited as the "Global Change Research Act of 1990".

#### SEC. 106. SCIENTIFIC ASSESSMENT.

On a periodic basis (not less frequently than every 4 years), the Council, through the Committee, shall prepare and submit to the President and the Congress an assessment which—

(1) integrates, evaluates, and interprets the findings of the Program and discusses the scientific uncertainties associated with such findings;

(2) 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

(3) analyzes current trends in global change, both human-induced and natural, and projects major trends for the subsequent 25 to 100 years.

# SOCCR-2 broad assessment framework

1. Carbon Cycle at Scales (*Global Perspective, North American Perspective, U.S. Perspective, Regional Perspective*)
2. Interactions/Disturbance/Impacts from/on the carbon cycle
3. Role of carbon in systems (*Soils, Water, Oceans, Vegetation, Terrestrial-aquatic Interfaces*)
4. Carbon Management Science Perspective and Decision Support (*measurements, observations and monitoring for research and policy relevant decision-support etc.*)



# **SECOND STATE OF THE CARBON CYCLE REPORT (SOCCR-2):**

## **PROCESS**

# SOCCR-2 overview

- Authoritative interagency assessment of the state of the carbon cycle across North America, emphasizing advances in the understanding of carbon cycle science and associated human dimensions of the carbon cycle of land, air, and water
- Emphasis on updating and new understanding since the First State of the Carbon Cycle Report (2007)
- A Scientific Assessment, part of the USGCRP Sustained Assessment focusing on U.S. and North American carbon stocks and fluxes in managed and unmanaged systems, but also considers the global context
- Policy relevant, but not policy prescriptive
- Includes relevant carbon management science and tools for informing decisions
- Draws on a wide range of scientific and technical inputs
- Provides multiple opportunities for stakeholder engagement
- Operates on clear science communication principles
- Ensures transparency of process and information
- Employs an extensive review process

# SOCCR-2 production & oversight

- In consultation with the Subcommittee on Global Change Research, an interagency Federal Steering Committee (composed of representatives from USGCRP agencies) and Carbon Cycle Interagency Working Group are responsible for the report's development
- Written by more than 200 Federal and non-Federal authors representing a range of carbon cycle science expertise
- Federal Administrative Leadership by USDA
- Management, coordination, facilitation provided by U.S. Carbon Cycle Science Program Office, logistical support by UCAR CPAESS, and technical support and review support from USGCRP National Coordination Office
- Production and editorial support provided by DOE Oak Ridge National Lab and USGRP
- Peer reviewed by an ad hoc committee of the National Academies of Sciences, Engineering, and Medicine
- Multiple opportunities for public input and review

# SOCCR-2 public engagement

Via Feb 2016 Public Call/Federal Register Notice:

- Public feedback on the **draft prospectus** helped shape overall content and direction of SOCCR-2
- A call for **author nominations** helped ensure a range of expertise was included in the writing process
- **Technical inputs** were solicited
- A series of public engagement events with stakeholders, ensuring more relevant, useable chapter content
- A call for **Review Editors** provided an important layer of external, independent validation that authors responded to external comments
- Nov 3, 2017 –Jan 8, 2018: stakeholders will have an opportunity to provide **public comments** via [review.globalchange.gov](http://review.globalchange.gov) on 4<sup>th</sup> Order Draft

# **SECOND STATE OF THE CARBON CYCLE REPORT (SOCCR-2):**

## **MILESTONES AND TIMELINE**

2015

May: SGCR/USGCRP  
Leadership approves draft  
report plan;  
Scoping workshop with  
science community

Summer-Fall: Federal  
Steering Committee,  
science leadership team,  
editorial team and report  
mechanisms, roles  
formalized

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2016

Feb: FRN nominations for  
technical contributors  
Public Forum

Spring-Fall: developed  
1<sup>st</sup> Order draft ,federal  
steering committee review,  
author revisions  
→ Second-Order Draft  
Interagency Review

2017

Spring-Summer : Author  
revisions, reviews by  
federal steering  
committee and USDA  
→ Third Order Draft  
Interagency Review

Summer-Fall  
Author revisions, reviews  
by federal steering  
committee, Oak Ridge  
editorial review  
→ Fourth Order Draft

Nov : Start of Public  
Comment Period and  
National Academy of  
Sciences (NAS) Review

2018

Jan 8: End of Public  
Comment Period

Feb 12: End of NAS  
Review

Early Spring: Author  
Revisions, federal  
steering committee  
and SGCR clearance  
→ Fifth Order Draft

Late Spring-Early  
Summer: Editorial  
Work/Production  
→ Final report and  
interactive website

Mid-2018:  
Final Report Release

**SOCCR-2**

**CONTENT DEVELOPMENT**

# SOCCR-2 scope

As approved by the SGCRC and Federal SC, as addressed in and related to the U.S. Carbon Cycle Science Plan (2011), the USGCRP Strategic Plan (2012-2021) and the Global Change Research Act (1990), and as informed by stakeholder input, SOCCR-2:

- Is a technical, scientific assessment focused on North American land and adjacent oceans' carbon cycle processes, stocks, fluxes, and interactions with global-scale carbon budgets and climate change impacts in managed and unmanaged systems
- Assesses current and potential trends, indicators and impacts, providing stakeholders and decision makers with the scientific basis for decisions
- Does not evaluate policy or make policy recommendations
- Includes major elements of the global carbon cycle (CO<sub>2</sub>, CH<sub>4</sub>) and key interactions with climate forcing and feedback components from a global perspective.
- Analyzes North American carbon cycle (scaled down from the global system), including short- to long-term and local, regional, and national perspectives on key carbon stocks and fluxes; and assesses
  - Carbon in unmanaged and managed Systems — Estimates of major stocks, fluxes, uncertainties, broader social drivers, and effects of past management decisions
  - Interactions and disturbance Impacts to the Carbon Cycle
  - Carbon cycle management practices, tools, and needs at various scales



	#	SOCCR-2 Chapters	Sections for each chapter (as appropriate)
	I	Preface/motivation for the report/ advances since SOCCR-1	i. Key Message/ Findings/Highlights ( incl. traceable accounts - see examples from <a href="#">Health</a> and <a href="#">NCA</a> supporting evidence)
	II	Governmental, intergovernmental and interagency context	
	III	Executive Summary	
Part I Synthesis	1	What is the C cycle and why care/the C cycle in a global context	ii. Introduction
	2	North American C budget past, present, and future	
Part II Human Dimensions of the C Cycle	3	Energy Systems (incl. Transportation)	iii. Historical context (incl. socioeconomic drivers of carbon emissions)
	4	Urban	
	5	Agriculture	iv. Current State of Carbon Cycle Understanding of Fluxes and Stocks
	6	Societal Perspective on Carbon	
	7	Tribal Lands	
Part III: State of Air, Land and Water	8	Atmosphere	v. Indicators, Trends, Feedbacks
	9	Forests	
	10	Grasslands	vi. North American and Global Context, Regional Perspective
	11	Arctic/Boreal/Permafrost regions	
	12	Soils	
	13	Terrestrial Wetlands	• <a href="#">NCA regions</a> • U.S., Mexico, Canada • E.g. Arctic, Tropics, <a href="#">RECCAP</a>
	14	Inland waters	
	15	Tidal wetlands and estuaries (incl. blue carbon)	
	16	Oceans and continental Shelves (oceans, methane hydrates etc.)	
Part IV: Consequences and ways forward	17	Consequences of rising atmospheric CO2 (e.g. ocean acidification)	vii. Societal drivers and impacts, carbon management and decisions
	18	Decision-support (social, behavioral, economic)	
	19	Future projections and associated climate change in North America	
			viii. Synthesis, conclusions, gaps in knowledge, and (near) future outlook
			• overarching synthesis of the current state of the carbon cycle
			• key knowledge gaps/ opportunities and near-term outlook on the North American carbon cycle

# SOCCR-2 author guidance provided

- Key Messages (2-6 per chapter): Authors' consensus expert judgment of the synthesis of the assessed scientific literature.
- Supporting text provides evidence and discusses implications
- A Traceable Account is required for each Key Message
- **Each Key Finding is accompanied by a "Traceable Account"**
  - 1) Provide additional information to readers about the quality of the information used,
  - 2) Allow traceability to resources and data,
  - 3) Document the process and rationale the authors used in reaching the conclusions in a Key Finding, and
  - 4) Describe the level of likelihood and confidence in the Key Finding, as appropriate

# Recent/next steps in SOCCR-2 review and clearance

- **2017**
- Spring: Author revisions, reviews by federal steering committee and USDA → Third Order Draft
- Summer: Review by the SGCR
- Summer-Fall: Author revisions, reviews by federal steering committee, editorial clean-up → Fourth Order Draft
- Nov 3: Start of Public Comment Period and National Academy of Sciences Review
- **2018**
- Jan 8: End of Public Comment Period
- Feb 12: End of NAS Review
- Early Spring: Author Revisions, federal steering committee and SGCR clearance → Fifth Order Draft
- Later Spring-Early Summer: Editorial Work/Production → Final report and interactive website
- Spring/Summer: Final Report Release

THANK YOU

For process matters contact:

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and Dr. Gyami Shrestha (gshrestha@usgcrp.gov)

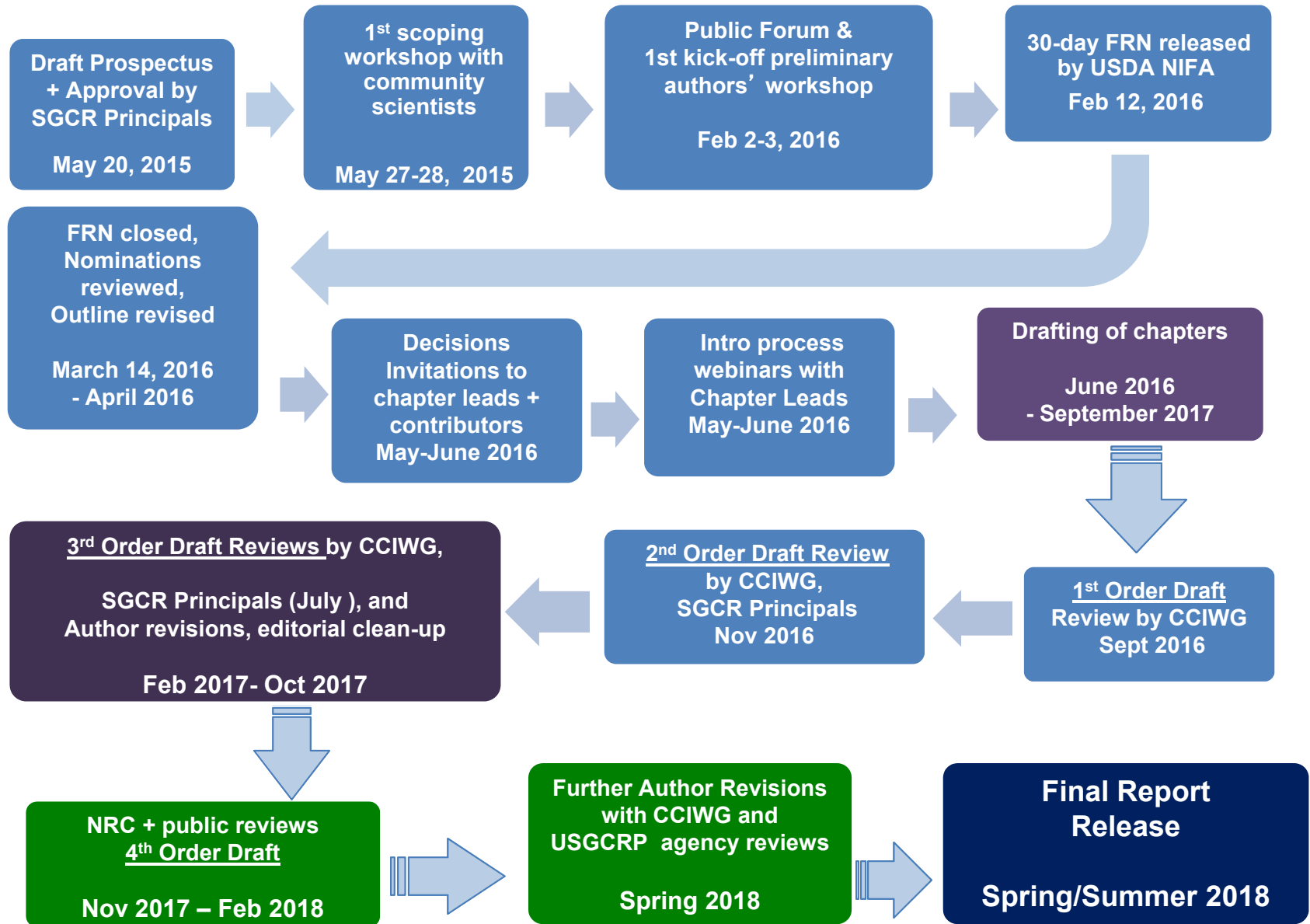
More info on web:

<https://www.CarbonCycleScience.us> & [GlobalChange.gov](http://GlobalChange.gov)

Tweet @USCarbonProgram and @usgcrp  
#SOCCR2 #NCA4

**ADDITIONAL SLIDES**

## Major SOCCR-2 PROCESS & MILESTONES (As of Fall of 2017)



Categories	#	SOCCR-2 chapters	Crosswalk with NCA4 Chapters
	I	Preface: Front matter and Guide to Report	All SOCCR-2 chapters can feed into Our Changing Climate, International & Mitigation chapters of NCA4
	II	Interagency context of U.S. Carbon Cycle Science	
	III	Executive Summary	
I: Synthesis	1	What is the C cycle and why care/the C cycle in a global context	Our Changing Climate, Complex Systems, Adaptation, Mitigation
	2	North American C budget past, present, and future	Adaptation, Mitigation, Land
II: Human Dimensions of the C Cycle	3	Energy Systems (incl. Transportation)	Energy, Transportation
	4	Urban	Built Environment
	5	Agriculture	Agriculture & Rural
	6	Societal Perspective on Carbon	Ecosystems, Land, International
	7	Tribal Lands	Tribal & Indigenous, Land
III: State of Air, Land and Water	8	Atmosphere	Our Changing Climate, Air Quality
	9	Forests	Forests, Regions
	10	Grasslands	Ecosystems, Land
	11	Arctic/Boreal/Permafrost regions	Alaska, International
	12	Soils	Ecosystems, Land
	13	Terrestrial Wetlands	Ecosystems, Water
	14	Inland waters	Ecosystems, Water
	15	Tidal wetlands and estuaries (incl. blue carbon)	Ecosystems, Oceans, Coastal
	16	Oceans and continental Shelves (oceans, methane hydrates etc.)	Oceans, International
IV: Consequences and ways forward	17	Consequences of rising atmospheric CO2 (e.g. ocean acidification)	Mitigation, Air Quality, Oceans
	18	Decision-support (social, behavioral, economic)	Adaptation, International
	19	Future projections and associated climate change in North America	Our Changing Climate, International

# SOCCR-2 roles and responsibilities

- **Subcommittee on Global Change Research (SGCR).** Overall responsibility for the report and its contents.
- **Administrative Agency.** USDA NIFA is responsible for establishing report procedures, releasing Federal Register Notices, and certifying the report meets Information Quality Act standards.
- **Federal Steering Committee (FSC) and Federal Liaisons.** Responsible for the development, production, and content of the report. Selects Science Leads, Lead Authors, and Review Editors.
- **Science Leads** work across chapters to ensure scientific consistency throughout the report.
- **Chapter Leads**, also selected via public nomination, led the chapter content development. Chapter author teams worked/work with Chapter Leads to develop and edit individual chapters in response to comments received during the multiple rounds of review. **Contributing Authors** provided inputs into chapter development. They were selected via a public nomination process and on an as-needed basis, based on specific needs identified by the author team.
- **Review Editors** are selected from a pool of experts put forward through a public nominations process. Their role is to ensure the authors adequately respond to all comments received during the public and National Academies review periods.



**SOCCR-2 TEAM**

USGCRP includes SGCR Principals, USGCRP NCO staff (NCA, GCIS, others)



United States  
Global Change  
Research Program

Lead agency:  
USDA (legal)

Carbon Cycle Science Interagency Working Group (CCIWG)  
+ SOCCR-2 Federal Steering Committee

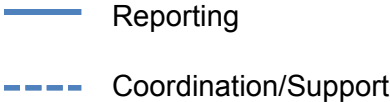
U.S. Carbon Cycle Science Program Office  
(i.e. Gyami Shrestha  
+ logistical support from UCAR CPAESS  
Boulder, Colorado)

Federal Liaisons  
for each chapter

5 SOCCR-2 Science Leads  
(Fed + non-Fed scientists)

Oak Ridge Editorial Team  
(reports to DOE)

Chapter Leads,  
Chapter Contributors  
(Fed + non-Fed scientists)



# Who's Who (SOCCR-2 Team)

CCIWG SOCCR-2 Fed Steering Committee and USGCRP	Organization
Nancy Cavallaro (Administrative Lead Agency POC + CCIWG co-chair)	USDA-NIFA*
Zhiliang Zhu (CCIWG co-chair)	USGS
Dan Stover	DOE Office of Science
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Carolyn Olson	USDA OCE
Noel Gurwick	USAID
Gyami Shrestha (U.S. Carbon Program Office Director)	CCIWG/ UCAR @USGCRP USGCRP & CCIWG POC for SOCCR-2

## Federal Liaisons (in addition to the Fed Steering Committee members)

Karina Schafer (NSF), Anne Marsh (USDA FS), Laura Lorenzoni (NASA), Jim Butler (NOAA), Eric Kasischke (NASA), Kathy Tedesco (NOAA), Libby Larson (NASA/SSAI)

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**Collaborative partnership  
with US, MX and CA  
scientists**