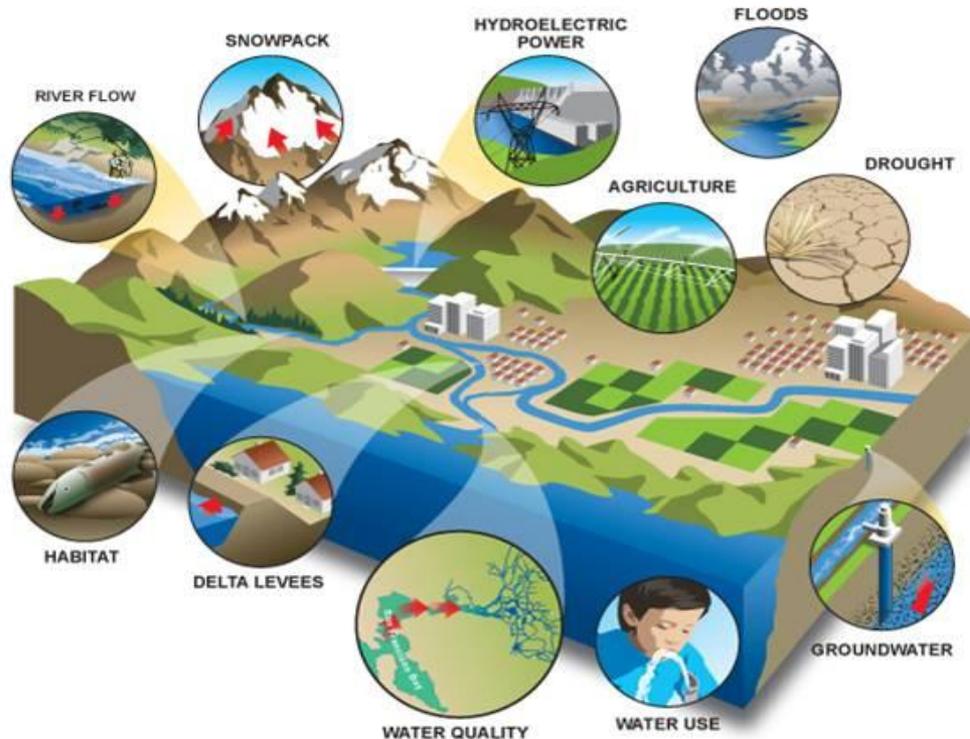


# Incorporating Climate Change into BLM Planning and NEPA Processes



**BLM National Land Use Planning Conference**

**“Keeping Pace with Change”**

**Portland, OR March 2009**

Angela Zahniser  
John Cossa  
Shannon Stewart



# Session Overview

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- Climate Change Science and Impacts (A. Zahniser)
- Incorporating Climate Change Science into the NEPA Framework (J. Cossa)
- Climate Change and NEPA (S. Stewart)



# Climate

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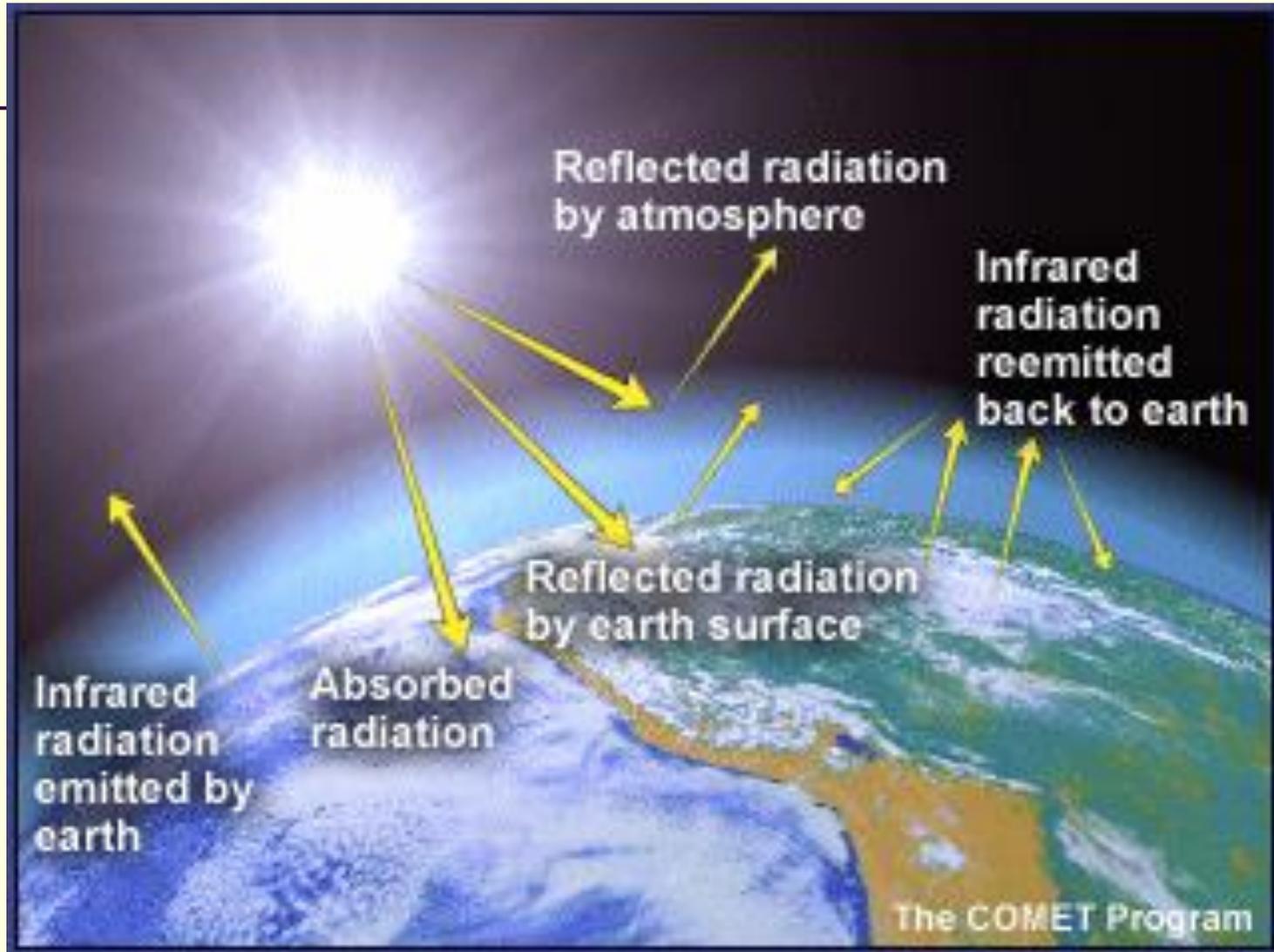


- Weather consists of daily temperature, sunlight, precipitation, pressure, humidity, sunshine, cloudiness, and wind. Climate refers to longer-term trends resulting from weather

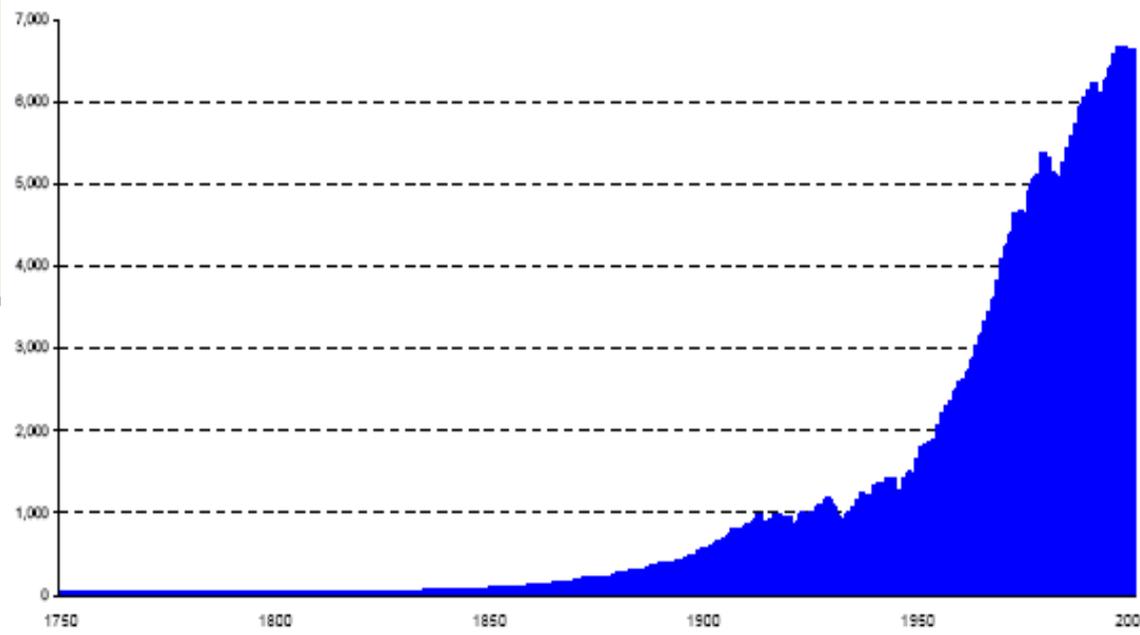
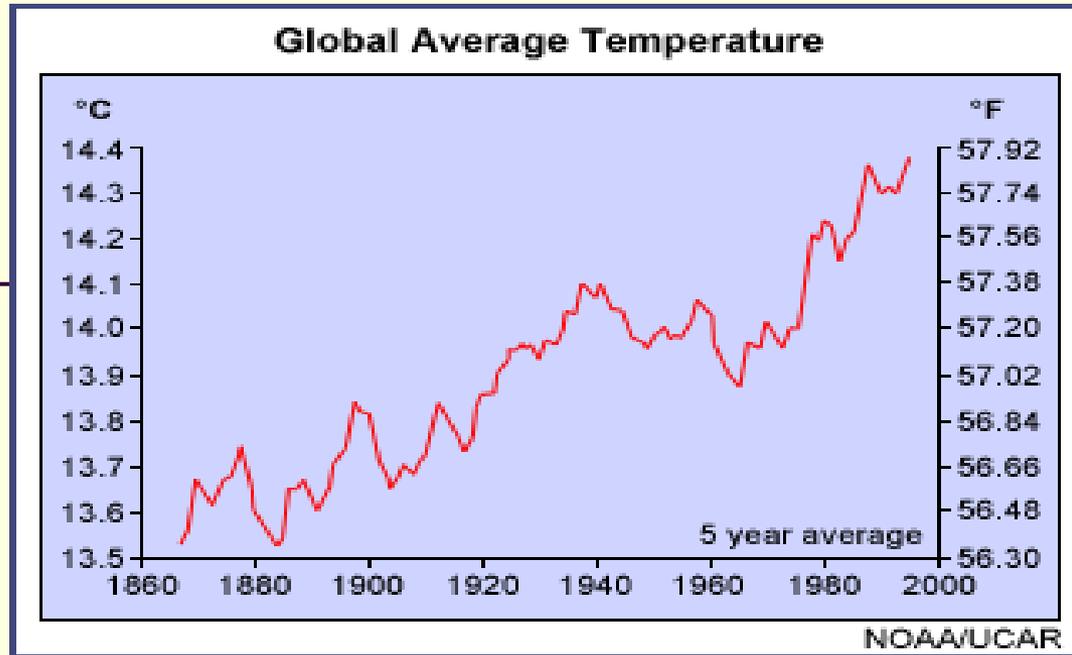
Influences:  
biological,  
ecological,  
and hydrological  
processes



# The Greenhouse Effect

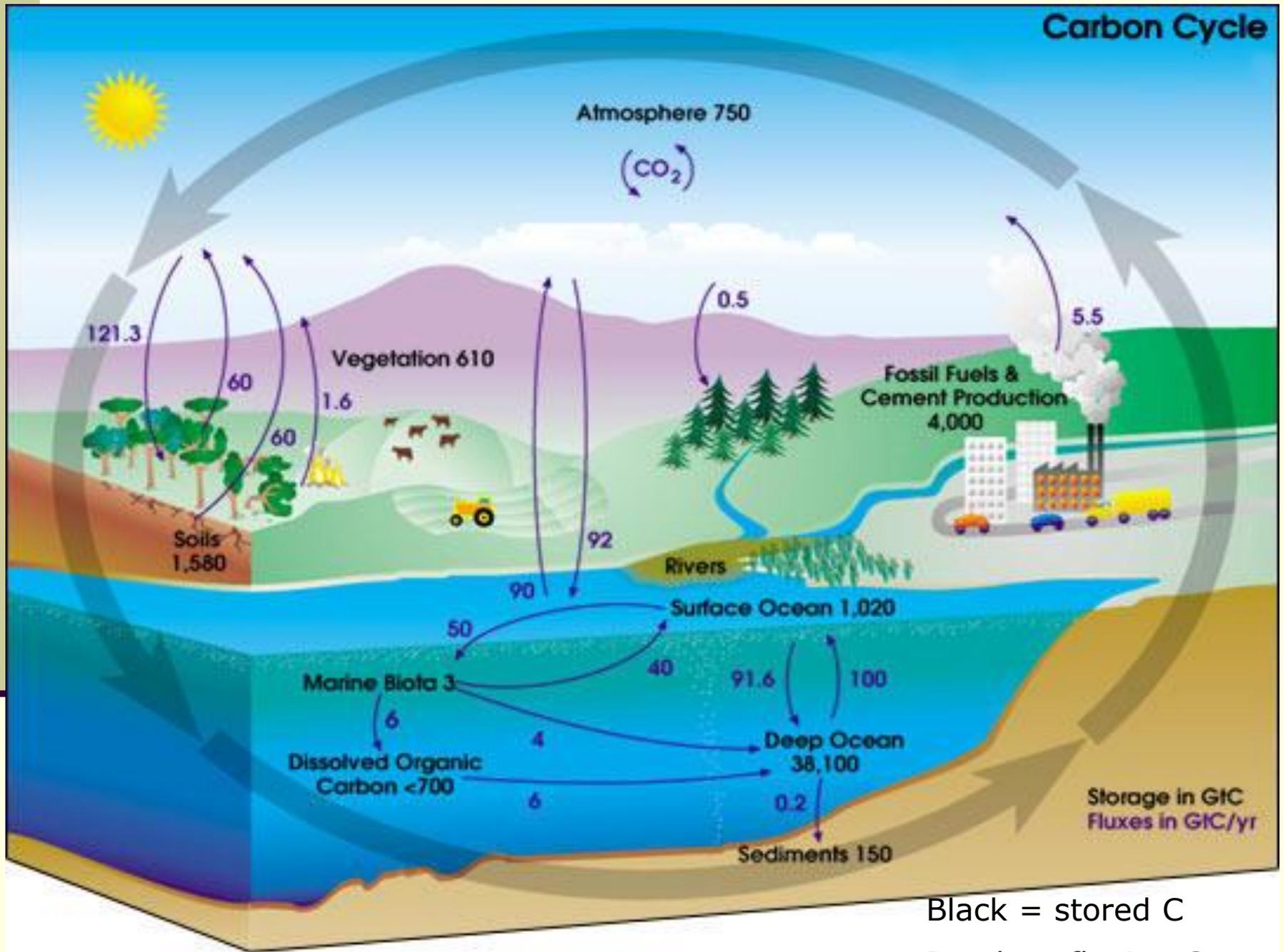


The climate on earth has always been variable; it is the current rate of change that is of concern



Life on earth relies on the greenhouse effect

# Carbon Cycle



Black = stored C  
 Purple = fluxing C

# Why Do We Care?

## Need to avoid 2<sup>0</sup> C temp. change

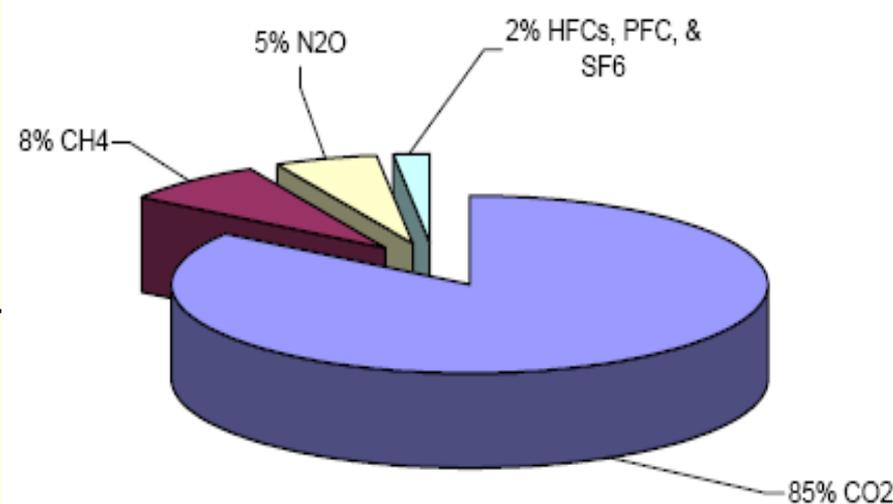
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### CO<sub>2</sub>(e) concentrations

- Pre-industrial: 280 ppm
- 2008: 385 ppm
- Target to avoid average 2<sup>0</sup> C: ~400 ppm;
- Projections BAU: 550ppm by 2060; 700 ppm by 2100
- to get to 400ppm: world <7,700 MMt CO<sub>2</sub> by 2100
- Today: US 2005: ~7000 MMt CO<sub>2</sub>  
World 2005: ~ 37,000 MMt CO<sub>2</sub>

## **GHG's:**

- CO<sub>2</sub>, GWP=1
- CH<sub>4</sub>, GWP=25
- N<sub>2</sub>O, GWP=298
- Fluorinated Gases (SF<sub>6</sub>, HFC's, PFC's)



Info: EIA and RFF

## **Major human activities contributing:**

- Fossil fuel burning
- Deforestation and Soil Degradation
- Manufacturing (Cement and Limestone Processing)
- Domesticated Animals
- Wetland rice cultivation

# Several Sides to the Story:

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- (1) how climate change is affecting resources and resource uses
- (2) how actions might contribute to climate change and
- What are we going to do about it? –potential adaptation, mitigation, sequestration, emissions control measures

# Climate Change Has Effects On:

## Water Quantity and Quality

Agriculture and grazing

Outbreak of Disease, Pests

Shifting of Seasons

Melting Permafrost & Sea Ice

Shifts in plant and animal population, range, and species diversity, migration patterns

Forestry

Extreme Weather Events



1941



2004

# How CC Affects BLM Resources

\*affects different resources in different ways in different regions

## ■ **Soil**

- Net decline in soil moisture
- Increases in landslides

## ■ **Cultural**

- **Fish:** Salmon stresses from premature snow melt, changes in species composition

- **Forests:** increased fire frequency , species mix and productivity

## ■ **Rangelands**

- **Water:** altered surface flows, timing, turbidity, evapotranspiration rates, winter flooding, summer water shortages

- Drier in some areas, wetter in others
- Sea Level Rise
- CA and NV: snow season decreased by 16 days from 1951-1996
- CA: winter runoff is expected to double by the 2090s
- Alaska: Since the 1950s:
  - Average warming of 4 degrees F
  - Growing season > 14 days
  - Sea ice < 40% loss of thickness

# How CC Affects BLM Resource Uses, examples

## Resource Uses

Grazing: increased heat stress for livestock

Recreation: Change in recreation and tourism seasons, fishing

## Harvesting



Colorado: The beetles spread to 400,000 more acres in 2008, bringing the total area infected to about 2 million acres since 1996, when foresters first began tracking the outbreak.

**Figure II-3. Sinkhole Created by Thawing Permafrost**



(Source: Vladimir Romanovsky, University of Alaska Fairbanks; UCAR, 2007) 13

# How BLM Activities Contribute to GHG Emissions and other Climate Drivers

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- GHG Emissions
- C Sequestration
- Land Use -- i.e. changes to the natural carbon cycle due to land management practices
- Mitigation

## **Resources**

- Forestry
- Riparian Restoration
- Geologic Sequestration

## **Resource Uses**

- Grazing
- Oil and Gas Production
- Renewable Energy Development
- Forestry

# Potential Management Options— Adaptation/Mitigation/Avoided Emissions

## Land Management

- Manage from a watershed and ecosystem scale
- Plant New Biomass Afforestation/Reforestation/Restoration
- Preserve Existing Biomass
- Soil Management--Conserve SOM
- Vegetation Management--Avoid overgrazing
- Fire and Forest Management--Prescribed burns/controlled burns; manage density; establish stream buffers; decrease logging and road construction
- Harvest Management

# Potential Management Options— Adaptation/Mitigation/Avoided Emissions

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## **Water Management**

- Plan for the changes in water:
  - quantity, quality, and flow
- Update current water reservoirs
- Monitor Water Resources

## **Emissions Avoidance**

- Methane capture/reuse (no venting)
- Pneumatic devices (O&G)
- Less truck trips (vanpool)
- Switch to Tier 3 or 4 engines

# BLM Climate Change Authorities

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## Sec. Order 3226

“Consider and analyze potential climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, and/or when making major decisions affecting DOI resources.”

## Air Resource Management Program Manual

- (1) how resources may be affected by climate change
- (2) how BLM land management practices may or may not contribute to the potential effects of climate change, and
- (3) potential options for management response

# Incorporating Climate Science into the NEPA Framework

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- NEPA requires the BLM to discuss the **significant** environmental **effects** of its actions.
- The courts have held that this applies to climate-related effects as well as traditional environmental effects.
- However, because the current state of climate science prevents the association of specific actions with specific climate-related effects, the BLM can neither:
  - (a) Analyze the climate-related **effects** of BLM actions nor
  - (b) Ascribe any **significance** to these potential effects.

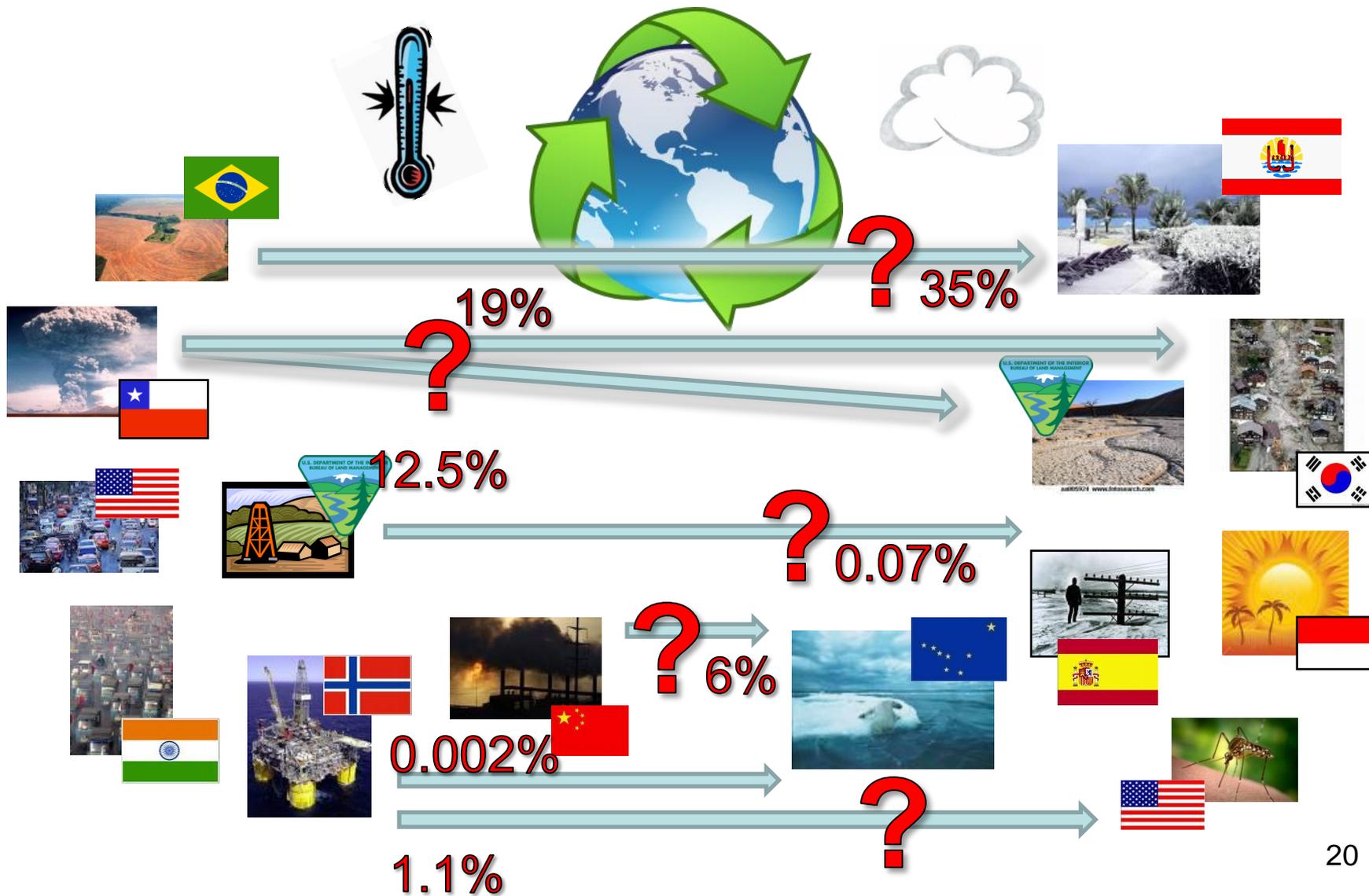
## **ISSUE:**

**How can the BLM apply climate science to defensibly account for potential climate-related impacts without engaging in endless (and burdensome) speculation?**

# Climate Change Causes and Effects



Therefore, it is currently not possible to associate specific climate effects with specific causes.



# But NEPA asks us to discuss the effects of our actions.

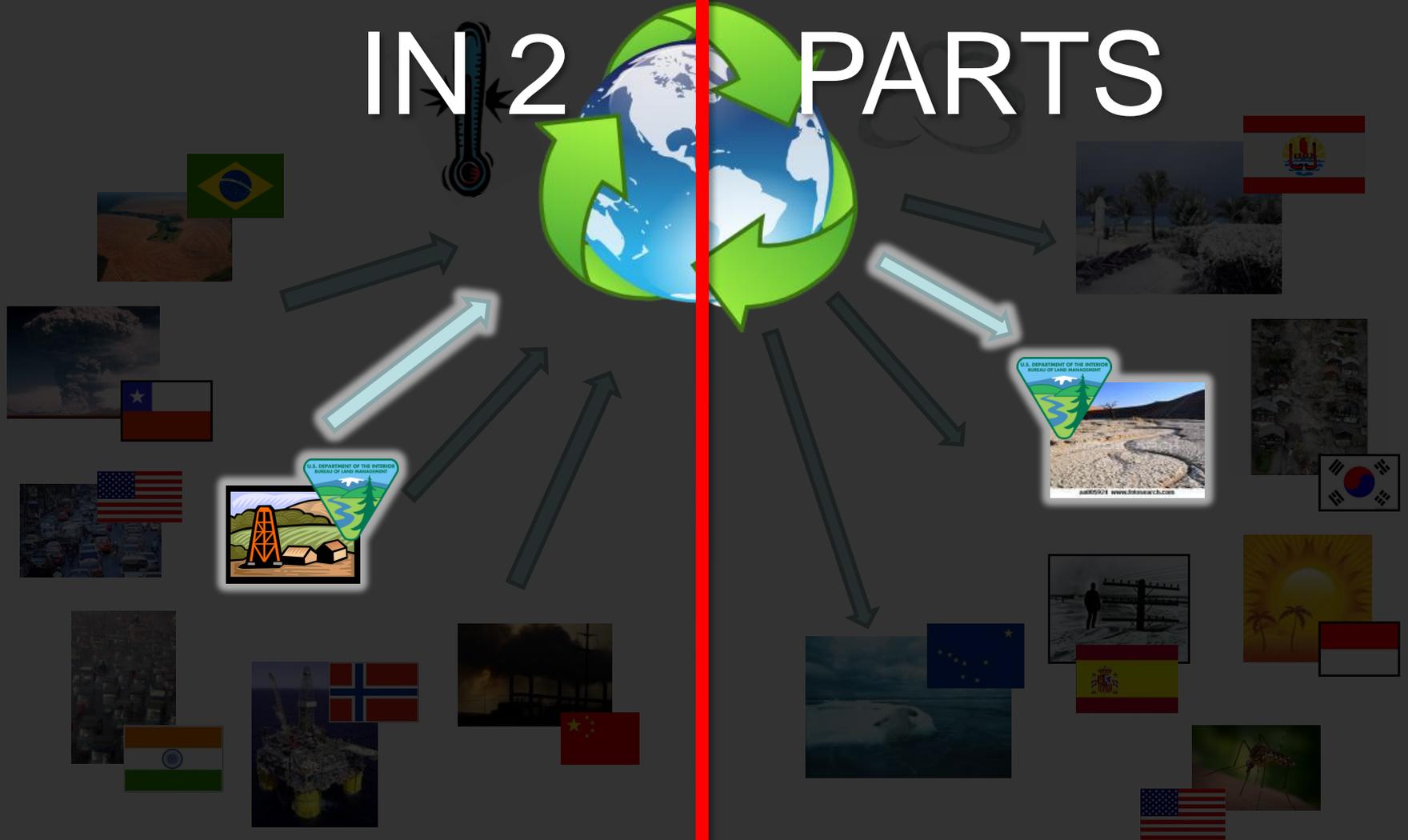






# So how do we analyze climate change in our NEPA documents?

## IN 2 PARTS



# Affected Environment

## PART 1



Although we cannot associate any climate-related impacts on our resources to specific BLM actions, we *can* discuss the effects that **climate change as a whole** has had, is currently having, and may, in the future, have on the resources we manage.

- Conceptually, **business as usual**: discuss effects of climate change on the water, species, and lands we manage.
- Wrinkle: Cannot assume that the current condition of our resources will be the same in the future. Must incorporate **reasonable projections over time**.

## CAUSATION:

**GHG emissions → Global Warming → Climate Change → Environmental Impacts**

- Climate Change is not, in and of itself, an environmental impact; it causes environmental impacts.
- It is not possible to trace a project's emissions/sequestration to environmental impacts.

## SIGNIFICANCE:

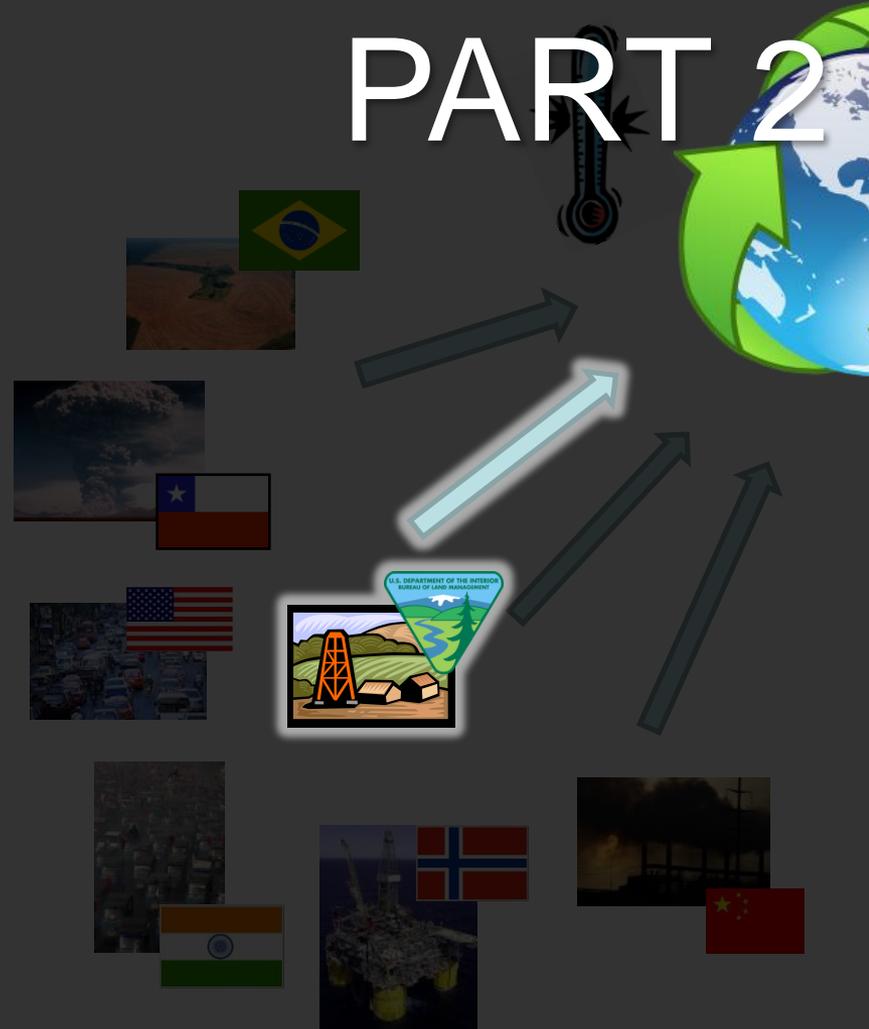
Finding of significance/no significance currently **not possible**.

## ANALYSIS:

- (1) attempt to **account for and disclose** BLM contributions to or mitigation of climate change,
- (2) **compare** those contributions/ mitigation to other relevant climate drivers, and
- (3) **discuss** the relationship between **causes and effects** of climate change.

# Environmental Effects

## PART 2



# Climate Change and RMPs, EISs & EAs

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## RMPs & Program/Activity EISs or EAs

- Evaluate the affected resources, the scope of the proposed action, and other factors to determine whether climate change-related issues warrant analysis and to what extent (NEPA Handbook 6.4.1).

# Climate Change and CXs

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## Categorical Exclusion (CX)

- CX does not provide an opportunity for climate change analysis
- Verify that there are no extraordinary circumstances (NEPA Handbook 4.2.2)
- Federal agencies should periodically review their policies and procedures to determine the effectiveness and appropriateness of their CXs

# Climate Change and DNAs

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## Determination of NEPA Adequacy (DNA)

- Issuance of a DNA confirms that the impacts of an action are adequately analyzed in existing NEPA documents (NEPA Handbook 5.1)
- Contributions of a proposed action to GHG emissions would not substantially change the analysis in an existing NEPA document
- Consider if the environment has changed such that the effects of the proposed action are substantially different from those analyzed in the existing NEPA document (NEPA Handbook 5.1)

# NEPA Considerations

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- How might resources and resource uses be affected by climate change?
  - Affected Environment
  
- How might the proposed actions or alternatives contribute to GHG emissions or other climate drivers?
  - Environmental Consequences (cumulative impacts)
  
- How will management respond?
  - Management goals, objectives, alternatives, project design, mitigation

# Climate Change and NEPA – General Principals

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- Large-scale analyses are neither expected nor encouraged
- Rely on information from entities with relevant scientific expertise (e.g. USGS, NOAA, etc)
- GHG emissions should be calculated only as available data allows and as is appropriate
- When little information is available, do not attempt to overanalyze the issue
- Field offices should concentrate on assessing climate change effects within their office area
- Use reliable, peer-reviewed scientific information

# Climate Change and NEPA

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## Scoping

- Acknowledge that climate change will be addressed and considered as necessary
- Invite the participation of affected agencies, tribes and other persons to assist in determining the climate change-related issues to be addressed
- Document issues in the scoping report

# Climate Change and NEPA

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## Introduction

- If a changing environment is a primary reason for completing a project or revising/amending an RMP, discuss
- When managing for GHG emissions or other climate drivers (e.g. increasing terrestrial carbon sequestration) is considered part of the purpose and need for action, describe appropriately
- Discuss any state or local climate change laws or regulations that may apply

# Climate Change and NEPA

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## Alternatives

- As applicable, discuss any specific climate change-related objectives in detail
- Do not discuss climate change impacts on resources or resource uses in the alternatives section (these are part of the affected environment and common across alternatives)
- In the 'Comparison of Impacts by Alternative' table, include an evaluation of GHG emissions and other climate drivers for each alternative qualitatively or quantitatively, as appropriate (summary of environmental consequences)

# Climate Change and NEPA

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## Affected Environment

- A climate change section should be added to “Affected Environment”
- Discuss available scientific assessments of regional impacts and projections for the analysis area and decide if they are appropriate to incorporate into the analysis
  - Effects are observable and measurable
  - Source of the information
  - Specificity of the projections; relevance to planning area
  - Level of confidence in projections
- Discuss observed/expected effects of climate change on resources and resource uses in individual resource sections

# Climate Change and NEPA

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## Environmental Consequences

- Impact analysis must take into account the dynamic baseline described in the affected environment
  
- Explain analytical assumptions for climate change:
  - The tools necessary to quantify incremental climatic impacts of specific activities are presently unavailable
  
  - Specific levels of significance have not yet been established
  
  - Climate change analysis for the purposes of NEPA therefore is limited to accounting and disclosing factors that contribute to climate change

# Climate Change and NEPA

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## Environmental Consequences (cont.)

- Cumulative Impacts Analysis:
  - Discuss the fact that the current state of the science makes the association of specific emissions with specific impacts impossible
  - Account, to the degree practicable, and disclose GHG emissions associated with the action alternatives
  - If data is available, put the data into a meaningful context
  - Discuss the impacts of “climate change” which represents the cumulative aggregation of all worldwide GHG emissions and other climate drivers

# Climate Change and NEPA

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## Environmental Consequences (cont.)

- Cumulative Impacts Analysis:
  - Account and disclose the factors that contribute to climate change associated with each action alternatives (GHG emissions, sequestration, etc.)
  - If data is available, put GHG emissions into a meaningful context
  - Explain that the impacts of climate change represent the cumulative aggregation of all worldwide GHG emissions and other climate drivers

# Special Considerations for EAs

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- It is currently not possible to say whether any given emission of GHGs will have a “significant” environmental impact
  - GHG emissions alone would not preclude the use of a FONSI
  - The nature of the action will determine whether climate change-related issues warrant analysis and to what extent (not the type of NEPA document)
  - If warranted, EAs should include the same kind of climate change analysis as an EIS

# Special Considerations for RMPs

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## Preparation Plan

- Discuss how the office plans to incorporate considerations of climate change; budget and schedule accordingly

## Analysis of the Management Situation (AMS)

- Include a discussion of the status and trends of climate change and climate change impacts to resources and resource uses within the planning area
- Identify management opportunities to respond to issues

# To Be Qualitative, to Calculate, or Both?

## *How Qualitative?*

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- No Cookbook Answer
  - could be a combination of the two (across resources)
- Depends on:
  - the degree to which the CC analysis informs the decision
  - the degree to which CC is an issue and as id'd in scoping
  - the amount, the reliability, and the availability of the information
- Is the info. essential to a reasoned choice among alternatives?
- Is the overall cost of obtaining the information exorbitant?
- Is it reasonable and practicable to calculate?

# General Principals: To Be Qualitative, to Calculate, or Both?

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- Be qualitative as necessary and calculate as data allows, and as is appropriate
- The type and availability of information should be drivers in determining whether GHG emissions are accounted, and done so when *reasonable and practicable*
- In general, if AQ EI is being done, add GHGs to it

# Example: Oil and Gas Wells

## Air Pollutant Emissions (Tons/Year) – Per Pad and Per Well

	CO2	CH4	CO2(e)
<b>Per Pad Basis</b>			
Construction	8.0	0.0	8.0
Operations	2.2	0.0	2.2
<b>Per Well Basis</b>			
Construction	303.7	7.9	501.2
Operations	734.7	7.3	916.1

## Air Pollutant Emissions (Tons/Year) – Development Scenarios

	CO2	CH4	CO2(e)
<b>10 wells on 10 pads</b>	10486	152	14286
<b>100 wells on 14 pads</b>	103977	1516	141877
<b>100 wells on 100 pads</b>	104857	1516	142749
<b>1000 wells on 100 pads</b>	1039366	15157	1418290
<b>1000 wells on 1000 pads</b>	1048565	15157	1427490

# Resources

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## Air Specialists

- NOC

- Senor Air Specialist, Scott Archer
- AQ Modeler, Craig Nicholls
- Air Resource Specialist (NEPA), Susan Caplan

- COSO

- LVFO

- WYSO

- WO

- Science Resource Specialists

- Air Specialists can provide emissions calculations and climatic expertise
- Utilize Resource Specialists for climatic effects on specific resources

# Information Resources

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- Alaska Climate Research Center at the Geophysical Institute at the University of Alaska Fairbanks, <http://climate.gi.alaska.edu>
- **Arctic Climate Impact Assessment**,  
<http://www.acia.uaf.edu/pages/scientific.html>
- **Bibliography of Sources for Climate Change and Water Resources**,  
[www.isse.ucar.edu/water\\_conference/biblio.html](http://www.isse.ucar.edu/water_conference/biblio.html)
- California Air Resources Board Climate Change Program,  
<http://www.arb.ca.gov/cc/cc.htm>
- Climate Change and Water Resources, List of Sources,  
[http://www.isse.ucar.edu/water\\_conference/biblio.html](http://www.isse.ucar.edu/water_conference/biblio.html)
- Climate Change Resource Center, Air and Waste Management Association,  
[www.awma.org/CCRC/index.html](http://www.awma.org/CCRC/index.html)
- Energy Information Agency –Greenhouse Gas Emissions data,  
<http://www.eia.doe.gov/environment.html>
- EPA Climate Change & Forests,  
<http://epa.gov/climatechange/effects/forests.html>

# Information Resources cont'd

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- **The GHG Protocol**, <http://www.ghgprotocol.org>
- **Impacts of Climate Change in North America, bibliography of studies**, <http://www.climate.org/resources/climate-impacts/unitedstates.html>
- **Inter-governmental Panel on Climate Change**, <http://www.ipcc.ch/>
- **Intergovernmental Panel on Climate Change's Fourth Assessment Report, including**
  - Working Group Reports: I: The Physical Science Basis,
  - II: Impacts, Adaptation, and Vulnerability, and
  - III: Mitigation of Climate Change,  
<http://www.ipcc.ch/ipccreports/assessments-reports.htm>
- **NOAA climate change website**,  
<http://www.ncdc.noaa.gov/oa/climate/climateextremes.html>
- **North American Regional Climate Change Assessment Program**,  
<http://www.narccap.ucar.edu/about/index.html>
- **US Climate Change Science Program**, <http://www.climate-science.gov/>

# Information Resources cont'd

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- **US CCSP Science and Assessment Product (SAP 4.4), Adaptation Options for Climate-Sensitive Ecosystems and Resources, U.S. Climate Change Science Program,**  
<http://www.climate-science.gov/Library/sap/sap4-4/final-report/>
- **US CCSP Science and Assessment Product (SAP 4.3) The Effects of Climate Change on Agriculture, Land, Water, and Biodiversity Resources in the United States.**  
<http://www.climate-science.gov/Library/sap/sap4-3/final-report/>
- **U.S. EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks,**  
<http://epa.gov/climatechange/emissions/usinventoryreport.html>
- **US Global Change Research Program,**  
<http://www.usgcrp.gov/usgcrp/default.php>
- **Western Climate Initiative,** <http://www.westernclimateinitiative.org/>
- **Western Regional Climate Center,** <http://www.wrcc.dri.edu/>
- **World Resources Institute Climate Analysis Indicator Tool,**  
<http://www.cait.wri.org>

# And more Information Resources

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- Greenhouse Gas Mitigation Assessment Guidebook, Chapter 13. UNFCCC 1995.
- [http://unfccc.int/resource/cd\\_roms/na1/mitigation/Resource\\_materials/Greenhouse\\_Gas\\_Mitigation\\_Assessment\\_Guidebook\\_1995/chap13.pdf](http://unfccc.int/resource/cd_roms/na1/mitigation/Resource_materials/Greenhouse_Gas_Mitigation_Assessment_Guidebook_1995/chap13.pdf)
- IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry.
- [http://www.ipcc-nggip.iges.or.jp/public/gpoglulucf/gpoglulucf\\_contents.htm](http://www.ipcc-nggip.iges.or.jp/public/gpoglulucf/gpoglulucf_contents.htm)
- IPCC Special Report on Land Use, Land-Use Change And Forestry
- [http://www.grida.no/climate/ipcc/land\\_use/index.htm](http://www.grida.no/climate/ipcc/land_use/index.htm)
- Energy Information Administration. Emissions of Greenhouse Gases in the United States 2005 <http://www.eia.doe.gov/oiaf/1605/ggrpt/land.html>
- Follett, Kimble, and Lal. The Potential of U.S. Cropland to Sequester Carbon and Mitigate the Greenhouse Effect. Sleeping Bear Press 1998. Lewis Publisher 2001.
- [Climate Change and Forests of the Future: Managing in the Face of Uncertainty](http://www.fs.fed.us/psw/publications/millar/psw_2007_millar029.pdf), *Ecological Applications*, 17(8), 2007, pp. 2145–2151, [http://www.fs.fed.us/psw/publications/millar/psw\\_2007\\_millar029.pdf](http://www.fs.fed.us/psw/publications/millar/psw_2007_millar029.pdf)
- EPA Greenhouse Gas Equivalencies Calculator, <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>
- [Colorado Water Conservation Board: Climate Change in Colorado: A Synthesis to Support Water Resources Management and Adaptation](http://cwcb.state.co.us/Home/ClimateChange/), <http://cwcb.state.co.us/Home/ClimateChange/>