Section 1: Introduction

Outline
1. Sources of information
2. Recent and future climate change
3. Indicators and impacts
4. What can we do?
Climate change “denialism” abounds!

Listen to the experts!

Listen to the experts

“I don’t know anything about gall bladders and kidneys, but I do know something about windshields.”
Listen to the experts!

1. Active climate scientists
   - 97% are convinced of human-caused climate change

2. National and international assessments

3. Scientific organizations

4. National academies

Who is listening?

- Cities, states/provinces
- Hunters/anglers
- US military
- Religious groups

Climate Change: The Current Science

Outline

1. Sources of information
2. Recent and future climate change
3. Indicators and impacts
4. What can we do?
Headline Statements from IPCC 2013 report

“Warming of the climate system is unequivocal... the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased.”

“Human influence on the climate system is clear.”

“Continued emissions of greenhouse gases will cause further warming... Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions.”

What’s new in IPCC 2013 report?

• improved analysis of observations of climate system
• climate models have improved
• evidence for human influence has grown
• additional impacts to human and natural systems have been documented

Recent (last 100+ years) climate change

Chart showing anomalies in global temperature.
Animation of map of temperature anomalies during last 100+ years

http://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4030

Positive proof of global warming.

Historical (last 12,000 years) climate change
Historical climate change from IPCC 2013 report

Future climate change from IPCC 2013 report

Future climate change from IPCC 2013 report
Climate Change: The Current Science

Causes ("forcings") of climate change

Carbon emissions continue

CO₂ higher than any time in last 400,000 years

www.esrl.noaa.gov/gmd/ccgg/trends/

www.globalwarmingart.com
Increases in greenhouse gases

Causes of climate change from IPCC AR5 SPM

Climate Change: The Current Science
Outline

1. Sources of information
2. Recent and future climate change
3. Indicators and impacts
4. What can we do?
Changes in extreme events

Historical observations

Model projections

Impacts to snow, streamflow

Benson Glacier, Eagle Cap, Wallowa Mtns, OR

1920 (H. Richardson)

1992 (D. Jensen)
Estimated effect of climate change on crop yields 1960-2013

IPCC 2013 WGII report

Projections of sea level rise

IPCC 2013 WGII report

If West Antarctica sheet melted...

William Haxby, Lamont-Doherty Earth Observatory

5 Meters (18 Feet) Sea Level Rise
Ocean acidification from increased CO₂

- Ocean pH (acidity)
  - 1900-2000: observed increase by 30%
  - by 2100: projected doubling

Biological indicators and impacts

Bull trout habitat to decline with future warming

Rieman et al. 2007
Bark beetle-caused tree mortality throughout North America

Wildfire: Projections based on future climate change

Observed evidence is consistent with warming
Impacts of future climate change

Climate Change: The Current Science

Outline

1. Sources of information
2. Recent and future climate change
3. Indicators and impacts
4. What can we do?

1. Reduce energy use
2. What else you can do

- Become more informed
- Talk to friends and family
- Vote with your dollars
- Consider career choices
- Support policy makers

3. Increase use of renewable energy and avoid extracting more oil, gas, etc.

4. Develop new technology
Climate Change: The Current Science

Summary and Conclusions

- Climate change is happening and will continue
  - global AND local
- Serious impacts to environment, including humans
- We can reduce future climate change, but we have to act now