

Taking Action: How Agriculture in Western Washington Is Adapting To and Mitigating Against the Effects of Climate Change

Nichole M. Embertson, Ph.D.

Whatcom Conservation District

Climate Change Symposium

October 25, 2012



Salmon



Shellfish



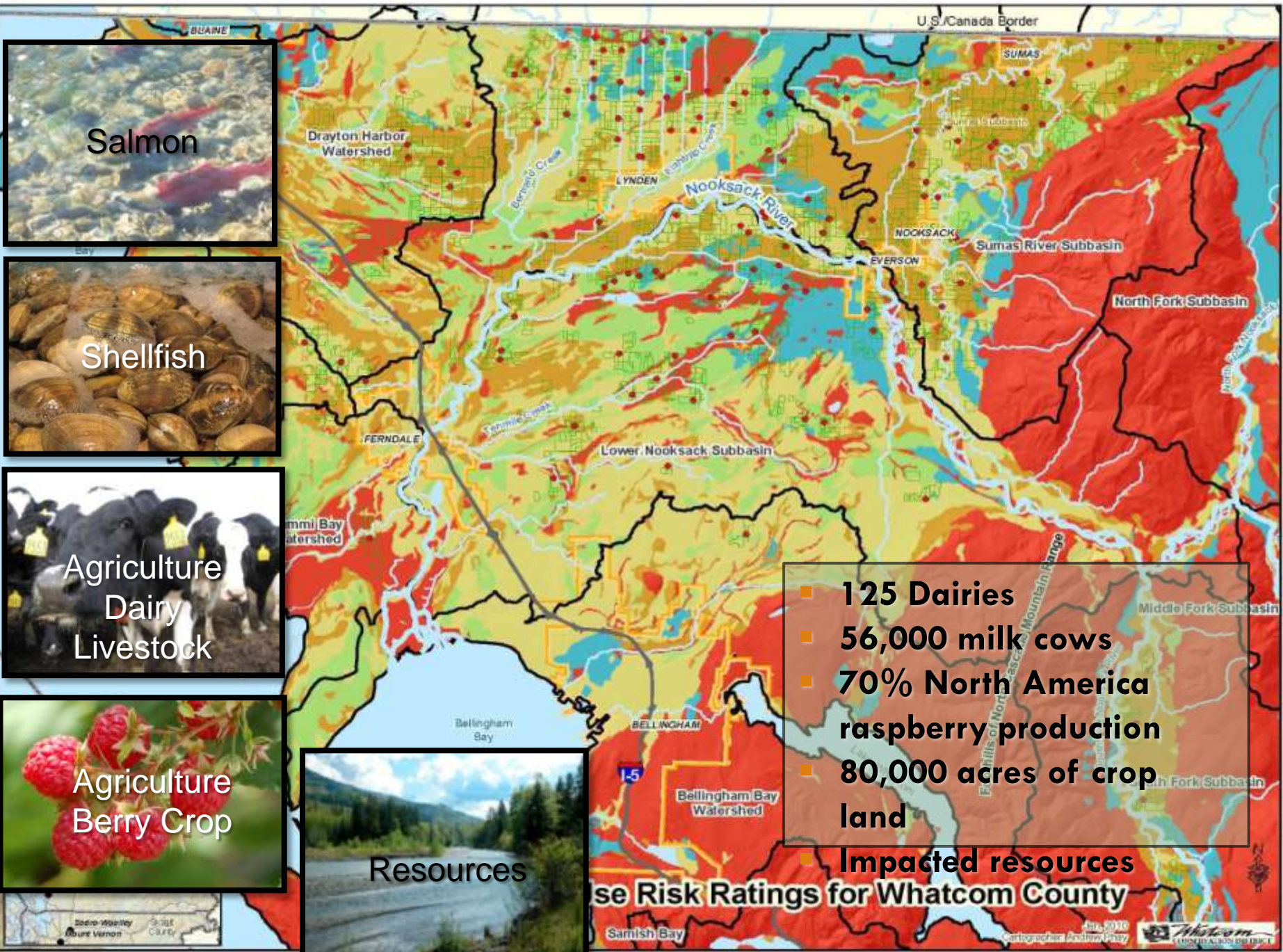
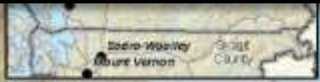
Agriculture
Dairy
Livestock



Agriculture
Berry Crop



Resources



- 125 Dairies
- 56,000 milk cows
- 70% North America raspberry production
- 80,000 acres of crop land
- Impacted resources

Use Risk Ratings for Whatcom County

Changing for Climate Change

□ **“The only thing that is constant is change”**

– *Heraclitus*

Ag Climate Change in the News

Eat Less Meat and Farm Efficiently to Tackle Climate Change, Scientists Say

ScienceDaily (June 19, 2012) — We need to eat less meat and recycle our waste to rebalance the global carbon cycle and reduce our risk of dangerous levels of climate change, according to scientists.



Science News

... from universities, jobs

Climate Change to Lengthen Growing Season

ScienceDaily (Oct. 10, 2012) — Across much of Norway, the agricultural growing season could become up to two months longer due to climate change. A research project has been studying the potential and challenges inherent in such a scenario.

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Railroad

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United States
Department of
Agriculture



Economic
Research
Service

Economic
Research
Report
Number 136

July 2012

Agricultural Adaptation to a Changing Climate

Economic and Environmental Implications
Vary by U.S. Region

Scott Malcolm, Elizabeth Marshall, Marcel Aillery,
Paul Heisey, Michael Livingston,
and Kelly Day-Rubenstein

[Embargoed until 9:30 a.m. (ET) Friday, Oct. 5, 2012]

Non-native Plants Show a Greater Response Than Native Wildflowers to Climate Change

COLUMBUS, Ohio – Warming temperatures in Ohio are a key driver behind changes in the state's landscape, and non-native plant species appear to be responding more strongly than native wildflowers to the changing climate, new research suggests.

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DAIRY HERD MANAGEMENT

Home > Scientists encourage citizens to heed signs of climate change

Scientists encourage citizens to heed signs of climate change

Kansas State University Extension | Updated: October 22, 2012



Ag Climate Change Resources

Washington State University Puyallup
Organic Farming Systems and Nutrient Management

Climate Change
 by Dr Craig Cogger



Climate change is a critical issue that will increasingly affect agriculture, water supplies, ecosystems, human well-being, and economic activity. Although many thousands of scientists across a broad range of disciplines are working on climate related issues, much confusion still exists among the public, media, and decision makers about the science of climate change and the future implications of a changing climate.

This web page includes a narrated Adobe Flash Player slide presentation that summarizes the science of climate change and its implications for humans and ecosystems. It is peer-reviewed and written at a lay level. It can be viewed with Adobe Reader and is divided into 10 short parts to allow viewing a few minutes at a time. The page also includes links to other scientifically-based web sites that provide a deeper understanding of climate science.

Please Read Notes on Slides - You can either use the browser back button at the end of a part to return to this page and start a new part, or use the link on the last slide of each part to continue to the next part (which might open in a new tab or new window). Click on slideshow play button to start slideshow. If you wish to read text instead of listening to speakers, click on the "Notes" tab in the slideshow

Part 1 (0 min)
Climate Change
 What Does the Science Really Tell Us?

Part 2 (6 min)
Part 2
A Few Important Definitions
 (Often Misunderstood)

Part 3 (6 min)

Part 4 (4.5 min)

Part 4

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Animal Agriculture and Climate Change

Last Updated: March 16, 2012

Have a question?
 Try asking one of our Experts

Print
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America's livestock and poultry production are impacted by changes in climate. This web based collection of information has been developed for dairy, beef, swine, broiler, layer, and turkey farmers and ranchers on the topics of climate change, carbon footprints, greenhouse gases, and effects of climatic changes.



OUR GOAL IS TO:

- Provide science based information to make decisions that result in reduced greenhouse gas emissions without sacrificing America's capacity to produce meat, milk, eggs and other animal products
- Assist producers in adapting production systems to maintain animal health and

This resource area was created by the Animal Manure Management community

Resource Area Fields

- Track all new content

In This Resource Area

October Newsletter
 Waste to Worth Conference

Topics:

- Air Quality
- Beginning Farmer
- Climate Change
- Environmental Planning
- Feed Management
- Manure Nutrient Management
- Manure Treatment Technologies
- Pathogens
- Regulations
- Small Farms
- Manure Storage, Handling & Mortality
- Value and Economics of Manure

Webcast Series:

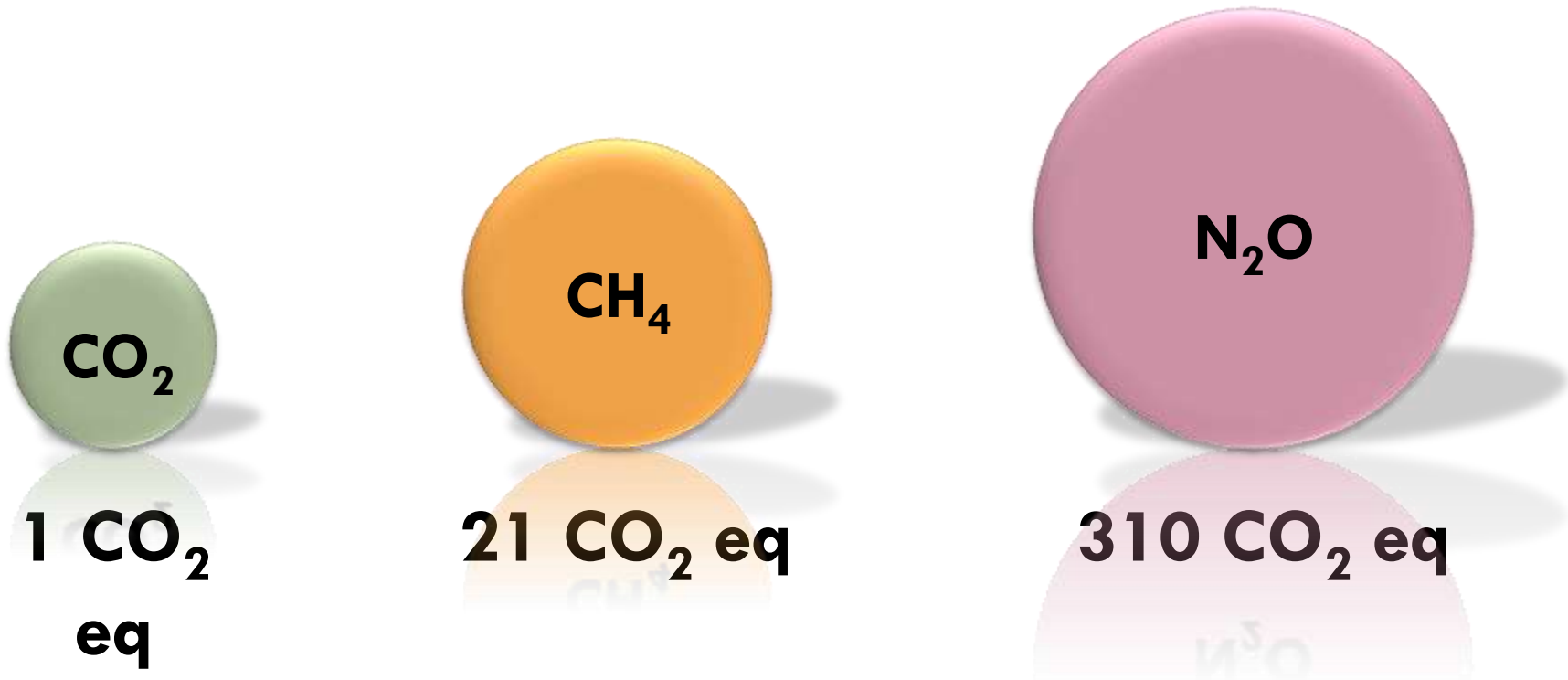
- Archived Webcasts
- Upcoming Webcasts
- Continuing Education Units

Resources:

- LPES Curriculum
- Research Summaries
- Follow LPELC on Twitter
- LPELC on YouTube

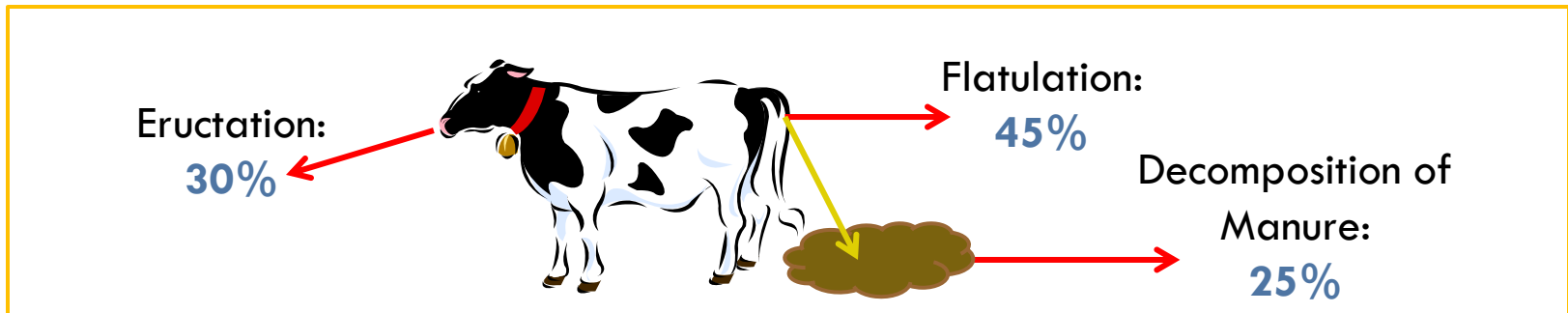
GHG and Climate Change

- Greenhouse gases contribute to global climate change



Agriculture Contribution to CC

- **Carbon Dioxide** (<1%; -14%)
 - ▣ Sink – Sequestration by plants
 - ▣ Source – Vehicle emission, deforestation
- **Nitrous Oxide** (~69%)
 - ▣ Source – De/nitrification of nitrogen in soils
- **Methane** (~33%)
 - ▣ Source – Ruminates, anaerobic decomposition



Reduction of GHG Contribution

- **Equipment emissions**
 - ▣ Change from diesel/gas to electric
 - ▣ More efficient engines
- **On-farm emissions**
 - ▣ Digesters - reduce methane (CH_4) emissions
- **Field Emissions**
 - ▣ Modify practices to reduce nitrous oxide (N_2O)
- **Use manure instead of chemical fertilizer**
 - ▣ Reduce external production of GHG
- **Source local**

Impacts of Climate Δ on Agriculture

- **Temperature**
 - ▣ Effect crop type/yield and animal performance
- **Precipitation**
 - ▣ Effect planting dates and irrigation, runoff
- **Extreme weather events** (i.e., flood, drought, wind, etc.)
- **Pest and disease vectors**
 - ▣ Impact crops and animals
- **Increase in atmospheric CO₂**
 - ▣ Positive for plants

Impacts of Climate Δ on Agriculture

- **Economics**
 - ▣ Effects choices and behavior
- **Land conversion**
 - ▣ Conversion from crop to urban
- **System inputs**
 - ▣ Feed availability, price of inputs, etc.
- **Seed availability**
 - ▣ Favorable crop types not available
- **Monoculture systems**
 - ▣ Not able to adapt



Adaptation to Impacts of Climate Δ

- Change crop variety and rotation - biodiversity
- Genetic selection of crop and animals – vigor
- Planting and harvest dates
- Irrigation schedule
- Use manure instead of chemical fertilizer
- Field drainage management
- Pest management
- **RESOURCE TRADE OFFS**

Climate Change and YOU

How are you impacted?

- Food prices
- Community structure
- Livelihood
- Change in landscape

What can you do?

- Reduce your impacts
- Support agriculture “doing it right”
- Support local business making an impact

Thank You!



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