



Rocky Mountain Partner Forum  
Climate Change Planning Workshop  
4-5 June, 2013 • Bozeman, MT



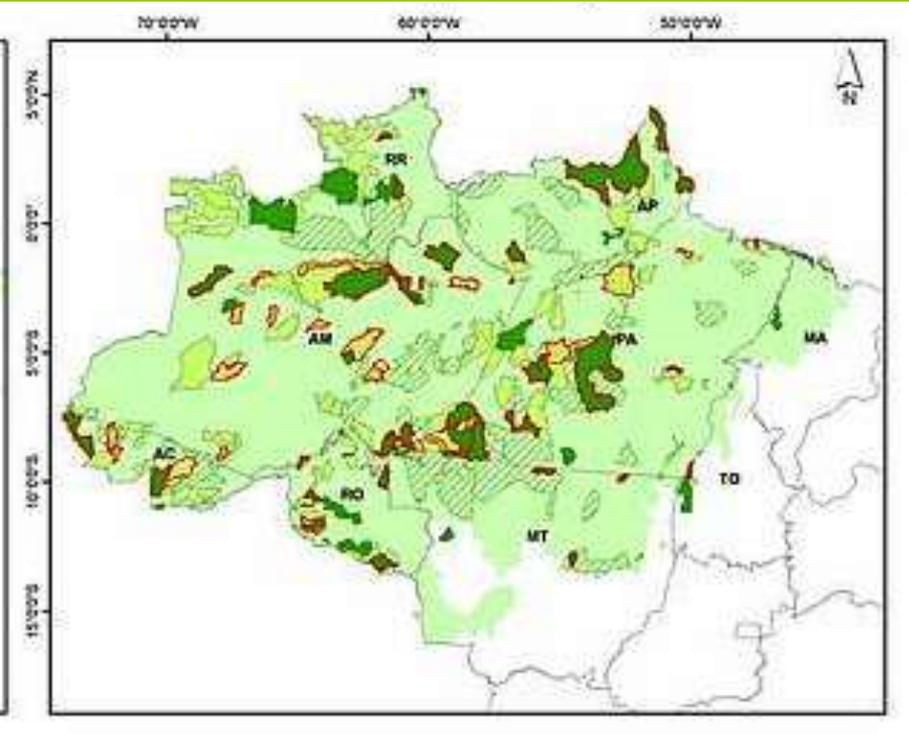
“Houston, we’ve had a  
problem.”

*-Jack Swigert*

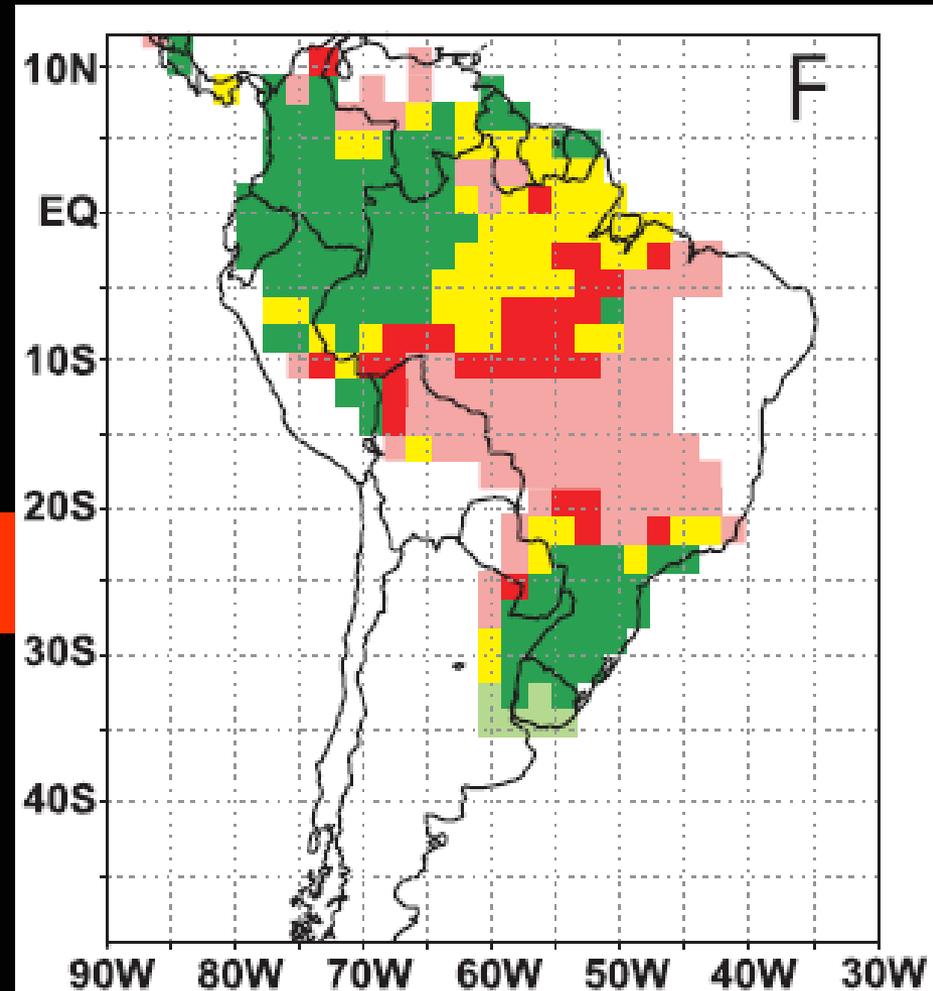
Astronaut, Apollo 13

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# Increasing Connectivity & Protected Areas



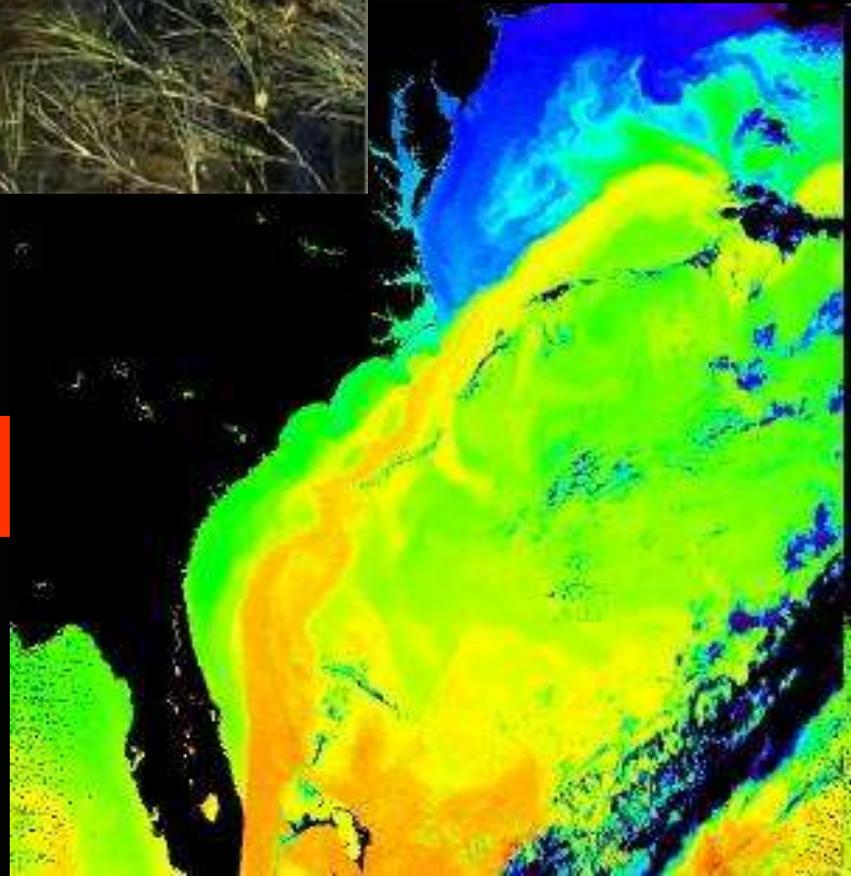
$\Delta$  Temperature



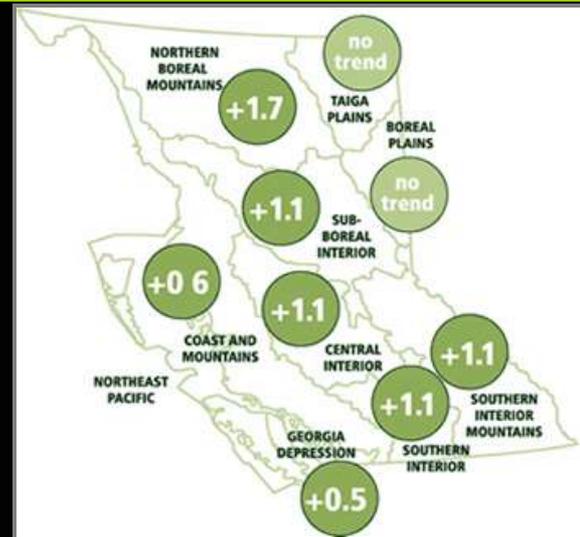
# Restoration



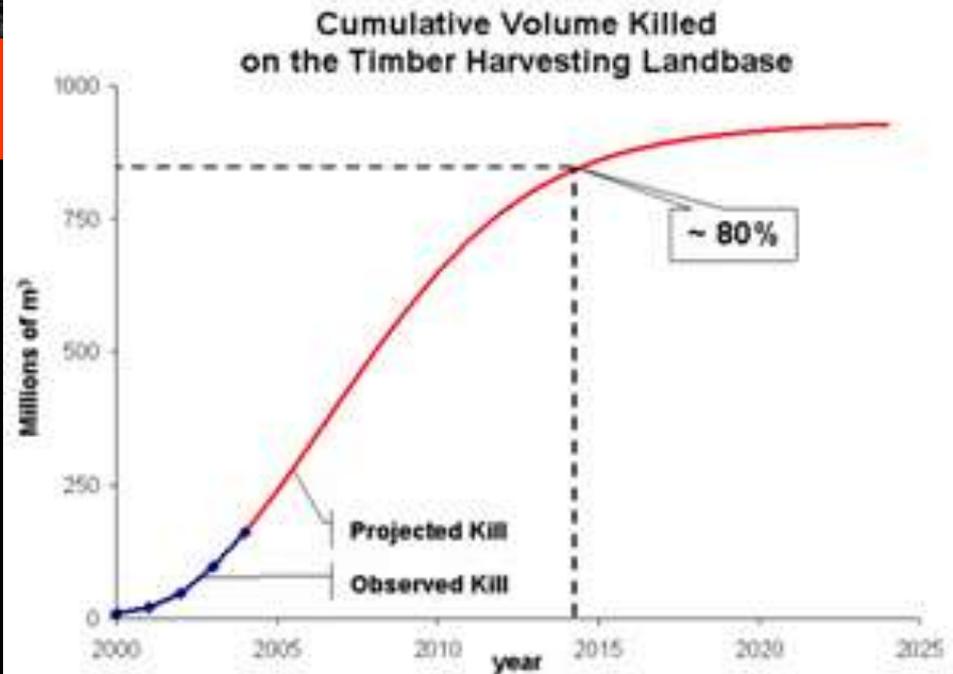
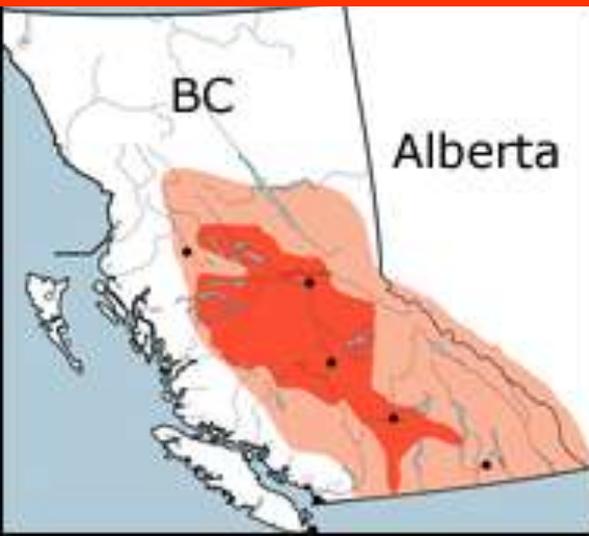
Warming water, range shift

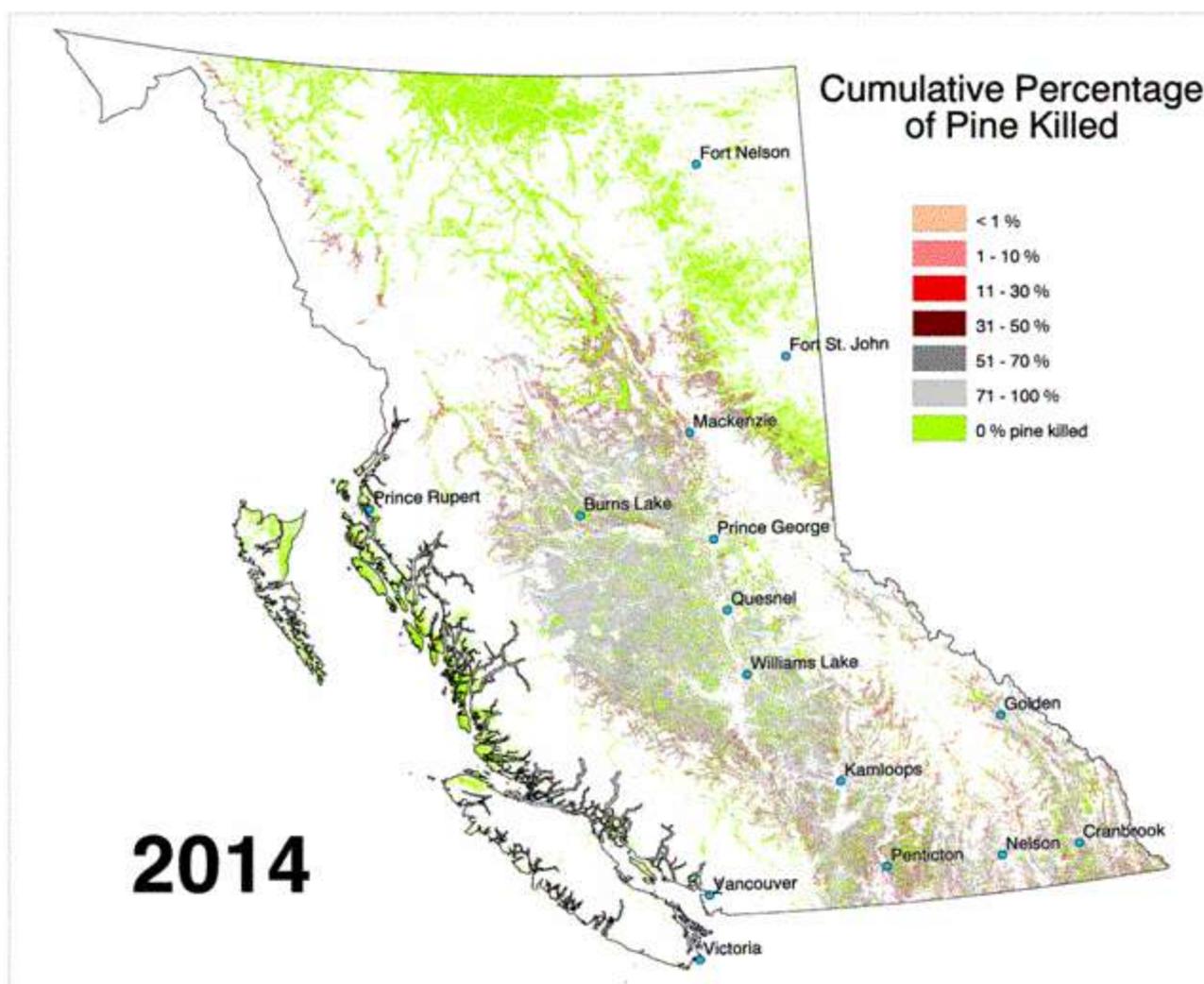


# Improving Forest Management



$\Delta$  Temperature



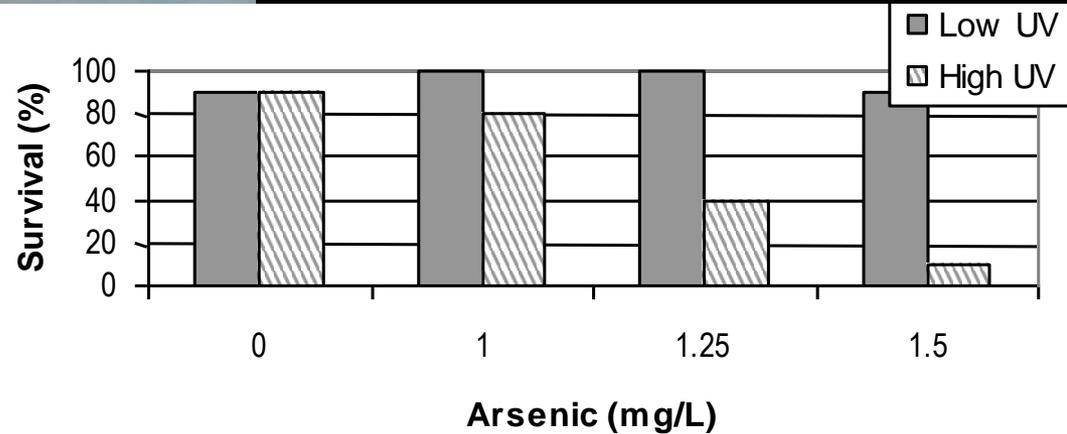


Source: Ministry of Forestry and Range

# Improving water quality



## Synergistic effects



*Climate change is affecting all ecosystems and the management actions we currently employ, and will continue to do so for centuries, so ...*

- We need to **incorporate climate change into long-term planning**
  - **Minimize** risk of wasting time, money, and effort
  - **Maximize** likelihood of success



But what can I do about it?



“Don’t Panic.”

*-Douglas Adams*

Hitchhiker’s Guide to the Galaxy

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# Vulnerability



## Adaptation Options



**Resistance**

**Resilience**

**Response**

For more on this, see the 3 Little Pigs Advice Column on [www.cakex.org](http://www.cakex.org)



**Should I take my umbrella?**





Goals + Context + Weather  
determine what you will do

**Should I take my umbrella?**

Climate data alone will not determine actions.



# Reducing vulnerability

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$$\text{Vulnerability} = \text{exposure} + \text{sensitivity} - \text{adaptive capacity}$$

↓ *Reduce exposure*

↓ *Sensitivity*

↑ *Increase adaptive capacity*



# EcoAdapt's Five Tenets of Climate Savviness

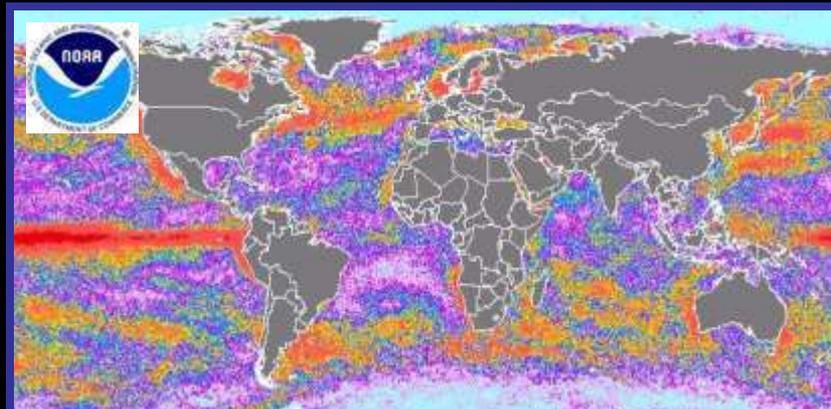
(Take 'em or leave 'em.  
They're just here to help)



# 1) Protect adequately and appropriately for a changing world

**Plan spatially, think temporally!**

- Refugia
- Gradients (Latitudinal/Elevational)
- Heterogeneity
- Gene flow/Connectivity
- Inclusion of other changes in the watershed/landscape/seascape

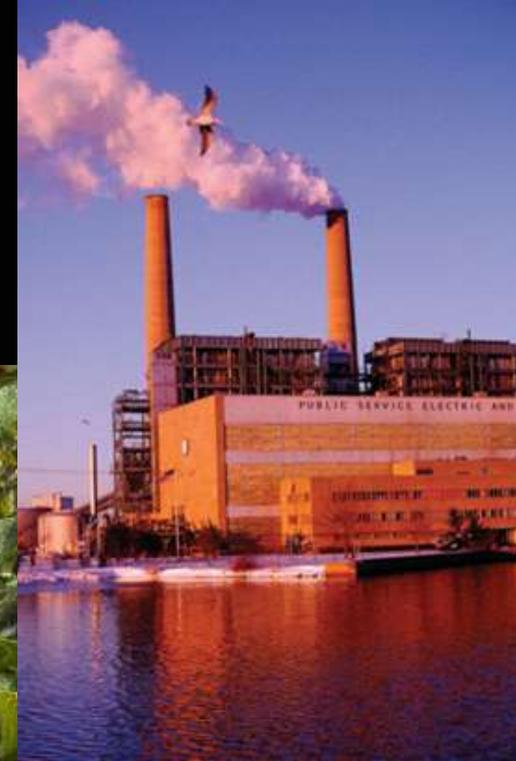


## 2) Reduce non-climate stresses

Invasive & Pest Species



Unsustainable Harvest

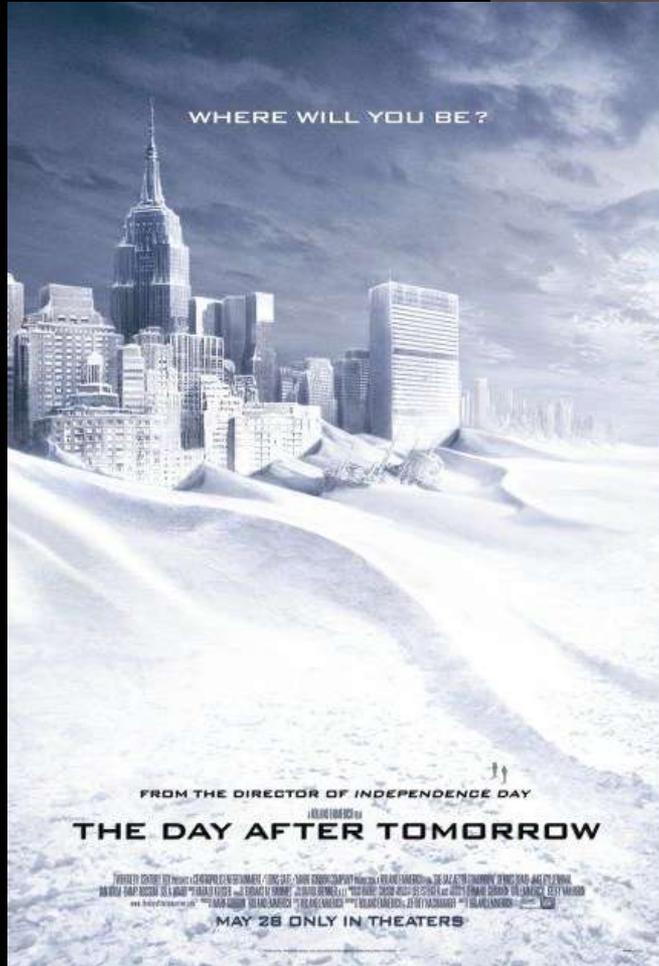


Agriculture & Habitat Fragmentation



Pollution & Habitat Degradation

# 3) Manage for Uncertainty



# 4) Reduce local and regional climate change

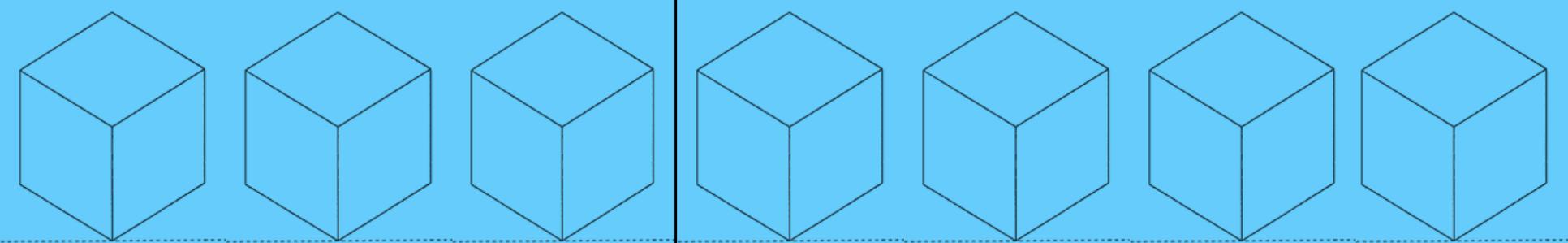


# 5) Reduce Greenhouse Gas Emissions



Adaptation options have limits, some systems are very limited

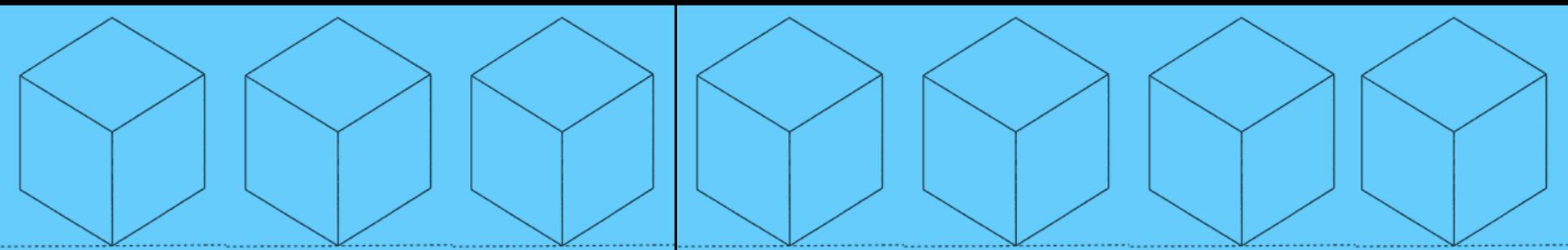
Polar habitat, high elevation habitat, oceans...



“There is no box.”

*-Amory Lovins*

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# Clark Fork Watershed Trout Protection



↑ Temperature, ↓ River Flow, Δ seasonal precipitation

## Solutions!

- minimizing urban sprawl & fewer homes in fire-prone areas
- allowing streams to utilize more floodplain area
- boosting water conservation measures for homes, businesses, ranches and farms
- improving water delivery systems such as canals and ditches to increase water efficiency

# Adaptation Ladder of Engagement



## 6. Sharing

**Sharing:** Internal capacity and resilience building are great, but for long-term success increases when we share and learn with others—supporting adaptation as part of our own workflow.

## 5. Integration

**Integration:** Adapting is not a one-time action. It is a process of integrating climate-savvy thinking into how work, so you can assess, anticipate, or respond to change as it happens.

## 4. Implementation

**Implementation:** It is not enough to have a plan—you have to put it into action. This may mean implementing new laws or processes, or adjusting existing activities.

## 3. Planning

**Planning:** Knowing your vulnerability should not result in paralysis. Rather it should inspire you to develop a strategy! Move from assessing the problem to identifying solutions.

## 2. Assessment

**Assessment (or Taking Stock of the Situation):** Systematically assess how climate change might affect your work or other investments of time, effort and money.

## 1. Awareness

**Awareness:** Realizing that climate change affects your ability to meet your goals, either by altering the effectiveness of the tools you use to achieve your goal or by undermining your goal itself.



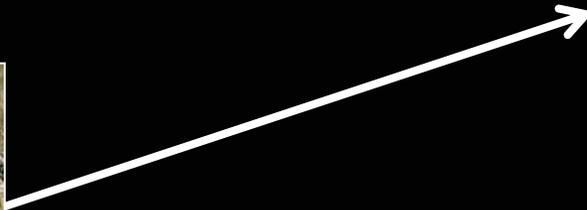
**ONLY YOU**

**CAN MAKE  
ADAPTATION HAPPEN**

# Adaptation at a Landscape Scale

The importance of thinking  
BIG about:

*Impacts & Vulnerability*  
*Adaptation Options*



# Adaptation at a Landscape Scale

Useful to know where smaller pieces of landscape fit within the bigger picture

More drastic measures taken when not necessary?



Highly vulnerable

Less vulnerable



# Adaptation at a Landscape Scale

Useful to know where smaller pieces of landscape fit within the bigger picture

Refugia insufficiently protected?



Less vulnerable

Highly vulnerable



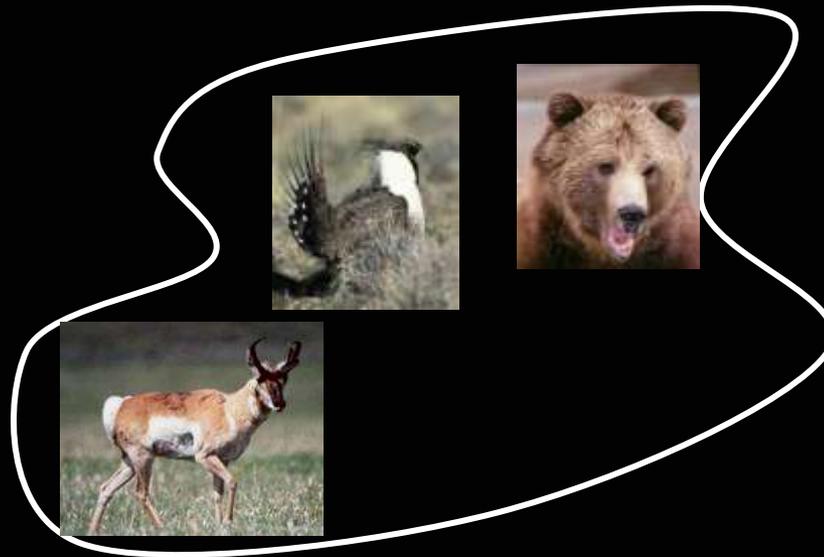
# Adaptation at a Landscape Scale

At smaller scale, tend to focus on what will be lost rather than what is coming into an area



# Adaptation at a Landscape Scale

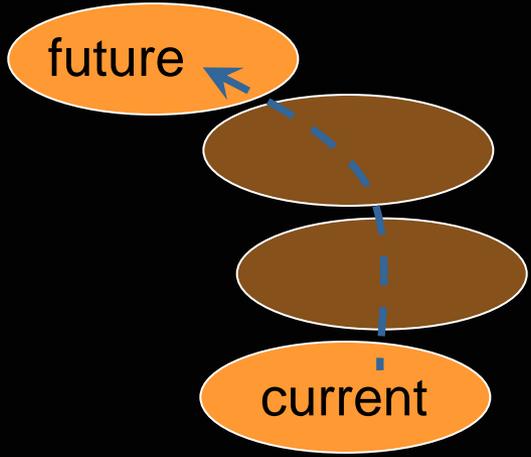
At smaller scale, tend to focus on what will be lost rather than what is coming into an area



Missed opportunities?

# Adaptation at a Landscape Scale

Some adaptation actions require cross-jurisdictional coordination



e.g., protecting / enhancing connectivity between current and future habitats



# Adaptation at a Landscape Scale

Some adaptation actions require cross-jurisdictional coordination

e.g., some actions may not be successful if only implemented at small scale

For example, a unit may decide to allow trees from further south and lower elevation to move in as climate changes...

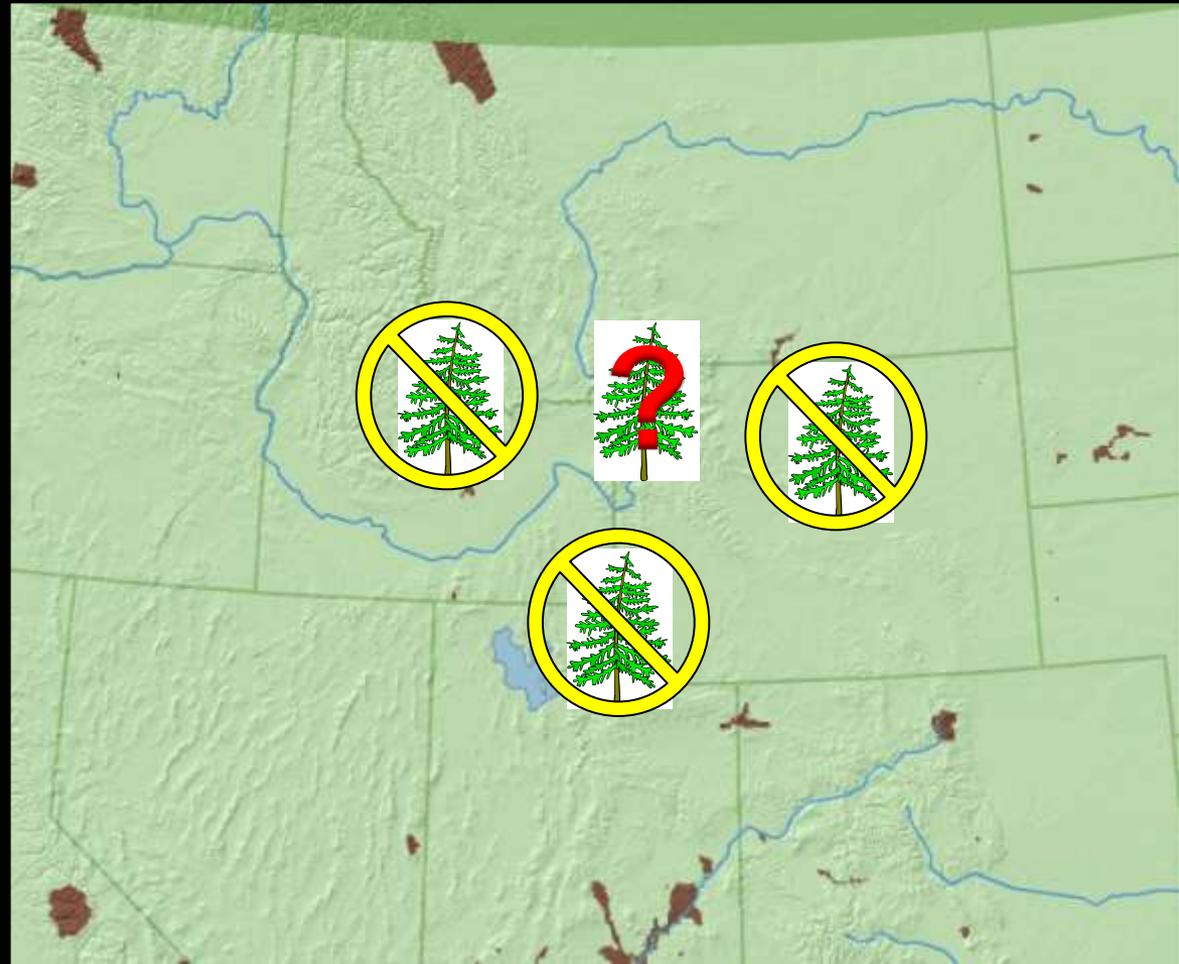


# Adaptation at a Landscape Scale

Some adaptation actions require cross-jurisdictional coordination

e.g., some actions may not be successful if only implemented at small scale

...but if surrounding lands decide to prevent the inward migration of those trees, they may not be able to achieve the transition they desire.



# Adaptation at a Landscape Scale

Economies of scale → more efficient pooling of resources and expertise



## Workshop Goals

Learn to incorporate CΔ info into conservation & management

With scale, consider CΔ impacts & management for watershed function/ cold water systems

Build climate change practitioners network for the region

Learn adaptation theory and practice

Learn regional climate science and resources

Share adaptation examples in the region

Work with your CΔ practitioners network

Clarify your goals and approaches

Assess vulnerabilities

Explore ways to reduce vulnerabilities

Identify needs, partners and actions

Breakout groups will mix:

- Geographies
- Disciplines

**GNLCC**  
Rocky Mountain Partner Forum  
Climate Change Planning  
Workshop  
4-5 June, 2013

## Workshop Diagram

## Workshop Outcomes

Adaptation strategies for managing watershed fcn/cold water systems

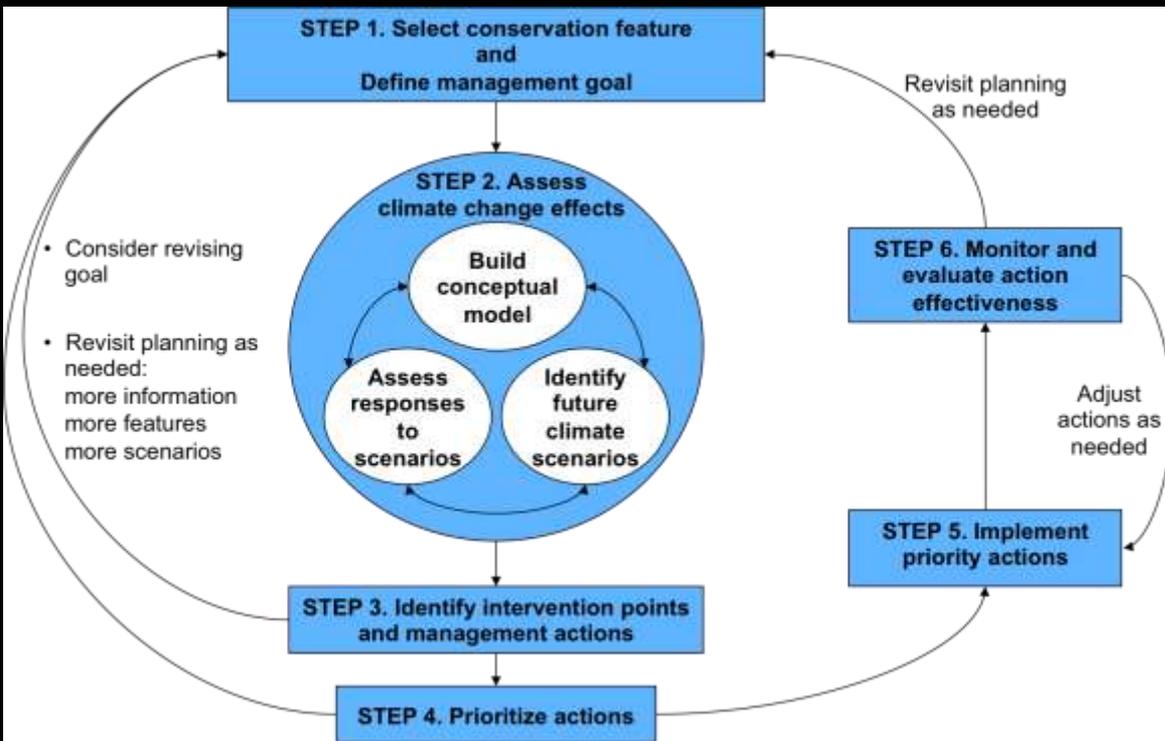
Priority science and information needs

Stronger climate change practitioners network

Experience considering CΔ in conservation & management

# Adaptation for Conservation Targets (ACT) Framework

[Cross et al. 2012]



Awareness to Action (A2A)  
planning efforts



Adaptive  
Management  
Initiative

Getting to Climate Savvy

1 What are the management goals and actions you undertake that are relevant to cold-water systems and species?

Goal(s):

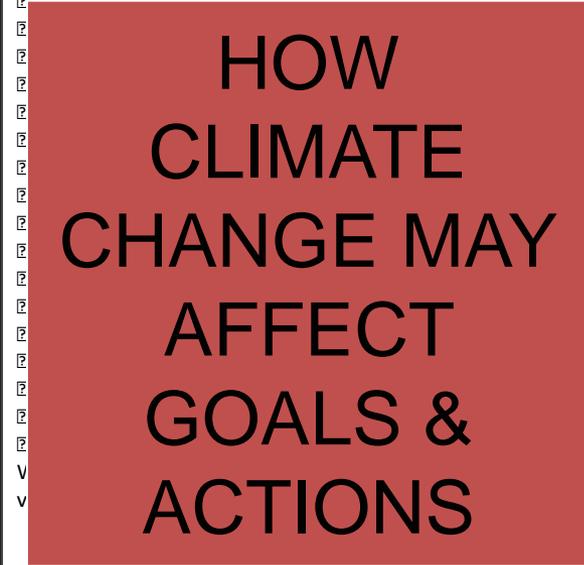
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THIS MORNING

2 How might climate change affect your likelihood of success? What are the vulnerabilities of your goals and actions, and what are the adaptation needs?

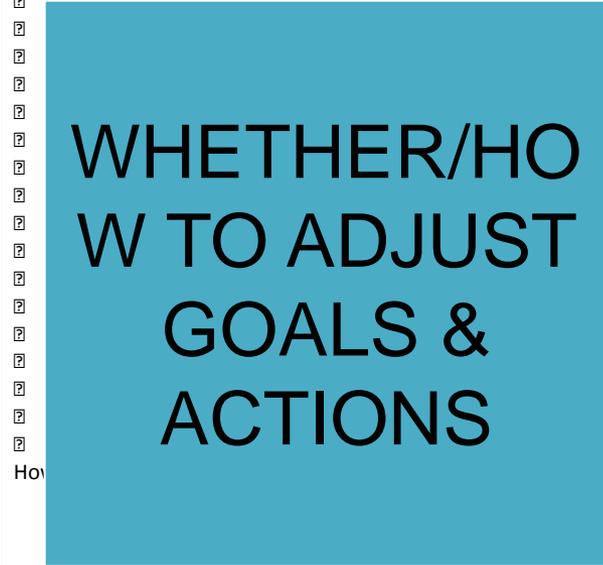
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THIS AFTERNOON

3 How can you reduce the vulnerability and meet the adaptation needs? Develop a plan with specific actions.

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THIS AFTERNOON & TOMORROW MORNING

**TOMORROW AFTERNOON:**

**Next Steps and Science Needs for Implementation**



Questions?