FINAL AGENDA

2010 PACIFIC NORTHWEST CESU ANNUAL MEETING

MANAGERS & EXECUTIVE COMMITTEE MEETING

US FISH & WILDLIFE SERVICE, 911 NE 11TH AVE., 4TH FLOOR CONFERENCE ROOM
PORTLAND, OR
APRIL 29, 2009

8:30-8:35	Introductions & purpose of meeting	Chris Lauver & Gordon Bradley
8:35-8:40	Welcome	Tom Hinckley, UW, SFR
	Agency Presentations on Climate Change Program Activities	
8:40-9:10	BLM	Karen Blakney, Research Liaison
9:10-9:40	USGS: *Climate Science Centers, and C3*	Lief Horwitz, Program Officer
9:40-10:10	FWS: *PNW Landscape Conservation Cooperatives*	Stephen Zylstra, Great Northern LCC
10:10-10:30	*Break*	
10:30-11:00	NPS: *Climate Change Response Strategy*	Dave Graber, Chief Scientist, PWR
11:00–11:30	Forest Service	John Laurence, Program Manager
11:30-11:45	Follow-up Q&A, morning session	
11:45-1:00	*Lunch (on your own)*	
1:00-1:30	NOAA	John Ferguson, Division Director
1:30-2:00	MMS	Heather Crowley, Oceanographer
2:00-2:30	NRCS	Greg Johnson, Team Leader
2:30-2:50	*Break*	
	Pacific Northwest CESU Business	
2:50-3:20	National CESU update, PNW CESU 5-year renewal update, general Q&A	Tom Fish, Nat'l CESU Coordinator
3:20-3:45	PNW CESU business (newsletter, strategic plan, etc.)	Gordon and Chris
3:45-4:00	Wrap-up	

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MEETING SUMMARY

Introductions and welcome

PNW CESU co-leaders Chris Lauver, NPS Research Coordinator, and Gordon Bradley, UW School of Forest Resources (SFR) faculty, welcomed the participants and reviewed the meeting agenda.

Tom Hinckley, Interim Director for UW SFR, reviewed recent restructuring affecting SFR, which hosts the PNW CESU on behalf of UW. In June 2009, UW established the College of the Environment, and SFR is a now a unit in that college. Hinckley stressed that the College of the Environment will collaborate on a broad scale, and the PNW CESU provides an important vehicle for collaboration. In accordance with mandates of the current federal administration, SFR seeks to be transparent and results oriented.

Tom Fish, Director, CESU National Network, announced an upcoming DOI conference on programs for managing across agencies on a regional scale, to include USFWS Land Conservation Cooperatives (LCCs), USGS Centers, and Fire Consortia. Fish also announced the biennial 2010 CESU National Network meeting, June 22-25, 2010, in Washington, DC.

Agency presentations on climate change program activities

<u>Bureau of Land Management, Karen Blakney, Research Liaison, OR/WA State Office</u>
See Blakney's PowerPoint presentation.

Discussion

The DOI directive is to analyze potential climate change impacts for management purposes; BLM is not a research agency.

For rapid ecological assessments, resource values intersect with change agents to determine vulnerabilities, which BLM will use to develop landscape strategies. For BLM and USFS, the scale will be critical.

There's never been adequate discussion of scale so that data can be integrated across agencies. The LCCs will be the land base. Ecoshare is a site for data-sharing across firewalls. Federal agencies can partner with universities to share data. There's a government data program but it's too big for where BLM's at right now.

The CESU Network must gain a stronger presence in all these agency initiatives. Visibility and awareness is an issue for CESU. LCCs can use CESUs as a mechanism that provides an alternative to contracting, providing the criteria of the cooperative agreement are met. Talk to agency staff. Get buy-in for the existing CESU program instead of developing a new program.

Remember the cost efficiencies of the indirect cost rate negotiated by CESU.

US Geological Survey, Lief Horwitz, Northwest Area Science Program Officer
See Horwitz's PowerPoint presentation.

Discussion

Climate Change Collaboration in the Pacific Northwest (C^3) is making a basic inventory of climate change projects. See the C^3 web site. All federal agencies on today's agenda are members of C^3 except MMS.

Cultural as well as natural resources need to be studied for impact

LCCs could a create model for student research and internships at LCCs for students, NGOs, and tribes. CESUs can provide a link to universities. If these internships were put together as "packages," universities could shop them around to donors for internship funding. The CESU could develop and streamline a program for internships offered by agencies, acting as the link between the universities and agencies.

University libraries are designated by Library of Congress as data repositories. Use that structure to store and share fed data.

US Fish & Wildlife Service, Stephen Zylstra, Regional Landscape Conservation Manager, Pacific Region Science Applications Program
See Zylstra's PowerPoint presentation.

Discussion

The difference between SCSs and LCCs is that SCSs deal with climate change in general, and LCCs are one part of the science arm that provides data to the SCSs.
SCSs & LCCs have no authority to implement strategies indicated by research results. They exist strictly to create collaboration, information sharing and goal setting.

There will be opportunities for interns in LCCs.

LCC science will include social and cultural issues if they relate to natural resources. Great Northern LCC sent letters to 21 tribal groups. Three want to be on the steering committee and others want to be plugged in.

It's important to recognize and include different types of knowledge—information (research) knowledge, practical (resource managers, citizen scientists) knowledge, and traditional (tribes, anthropologists) knowledge. We will need to build social capacity in resource managers to work with people at the table who haven't traditionally been there. New, young managers will come from more multidisciplinary backgrounds and may have more experience with this.

National Park Service, Dave Graber, Chief Scientist, Pacirif West Region
See Graber's PowerPoint presentation.

Discussion

NPS has responsibility for cultural resources and will insert that into climate change response as part of the $10,000,000 budget.

NPS strategizes communication regarding climate change through social science research, but has not done enough. The Protected Areas Studies Research Unit created by Darryll Johnson was the single effort in the Pacific West Region.

There's a need to educate staff to discuss climate change with the public. For example, a recent survey indicated that 40% of USFS staff don't believe climate change is a reality. Maybe universities can assist in teaching critical thinking skills and analyzing credibility. It's important to incorporate social science research at the initiation of a research plan, coupling natural and cultural resource issues, and not simply add social science research at the end as a way to disseminate findings. NSF provides funding for this.

US Forest Service, John Laurence, Research & Development Program Manager, Pacific Northwest Research Station
See Laurence's PowerPoint presentation.

Discussion

Land grant schools can use indirect costs as match but USFS can't pay IDC to land grant schools.

Research stations have social science research units. Most of their social scientists are economists. Research stations could expand their capacity through collaboration with universities.

National Oceanic & Atmospheric Administration, John Ferguson, Division Director, Northwest Fisheries Science Center
See Ferguson's PowerPoint presentation.

Discussion

The Climate line office has proposed putting it on the same footing as Weather. NOAA doesn't have a Climate budget line

Minerals Management Service, Heather Crowley, Oceanographer, Environmental Studies Program Alaska OCS Region,
See Crowley's PowerPoint presentation.

Discussion

MMS contracts its research and has extensive collaborations. The Alaska MMS range is three miles offshore, and renewable energy research isn't that practical for this range. Crowley is the coordinator of the Alaska Annual Studies Plan.

Natural Resources Conservation Service, Greg Johnson, Leader, Air Quality & Atmospheric Change Technology Development Team
See Johnson's PowerPoint presentation.

Discussion

NRCS is a conservation planning agency, not a research agency, and must collaborate with universities and other organizations to meet its research needs. The emphasis is predominately mitigation v. adaptation. NRCS develops tools for conservation, and works with private land owners.

Research needs of the Air Quality & Atmospheric Change Team are to understand more

about nitrous oxide, whole-farm life cycle analyses for evaluating new technologies, and better collaboration with the National Water and Climate Center to develop better snow and water forecasts.

How can universities facilitate integration of efforts, especially since NRCS has been very "state-centric." There isn't always a lot of integration within a single agency, so integration across agencies is a challenge. But universities can facilitate focusing at local levels, and coordinating at a local level, bringing all stakeholders to the table.

Pacific Northwest CESU business

Tom Fish, Director, CESU National Network provided an update on the five-year renewal of the unit. One goal identified in the self-assessment and earmarked by the national review committee is to increase participation of minority-serving institutions in our unit and recruit more such institutions to our membership. (UW is currently working with Salish-Kootenai tribe but they aren't members of PNW CESU).

In drafting the new agreement, all previous amendments are rolled into the new agreement, plus any adjustments. We need 100% membership signatures, and federal partners need to review appropriate authorities. We can add new members at that time, too. DOI agencies will need new agreement numbers. Other agencies may not.

Status of the most recent amendment, adding NOAA and Central Washington University—NOAA hasn't assigned a co-op agreement number yet. The reference to this number was removed from the amendment so that NOAA is an official member, but currently in "inactive" status. When they initiate their first task agreement, a number will be assigned.

The Bureau of Indian Affairs wants to join the National CESU Council. Once they do, they then can join individual CESU units.

There is a lack of consistency in the practice of the approval process for new member applications across the CESU network. Currently acceptance requires a unanimous approval vote. Federal applicants who are members of the National Council should not have to be voted in. Non-federal partners shouldn't be able to veto non-federal applicants, which in effect prevents applicants from competing for federal funds, and could create a closed system. Suggestions: change to a majority vote. Federal partners should approve non-federal applications. One scenario might be minimum application requirements for non-federal partners with three types of criteria: research, tech assistance, education. Maybe a memo to federal applicants saying there is no vote needed for those on the National Council.

Grants.gov is being used inconsistently across agencies. NOAA wants more competition in the CESU process. Posting, solicitation, and competition are interpreted differently across agencies.

<u>Activities of the national office</u>

- Creating an inventory of CESU projects undertaken to date (since 1999) to capture use data. To date, there are more than 3800 projects. Next an online project database will be created with search capability.

- Working with Colorado State University on outreach materials. How else to raise awareness? Go to the meetings of involved agencies. Other suggestions?

- Funding climate change workshops. There's one in the Great Plains this summer, and one in the Great Lakes in the fall.

- Developing a sustainable fellowship program, which has been tasked to a program fellow who is starting in the national office soon. The national office has applied to the DOI Youth Internship Program for funding for two positions.

- Developing an authority matrix for work with international partners.

General discussion

We should develop needs assessment for cultural resources so that these studies aren't done as an afterthought. NSF program couples natural systems and the human dimension, which forces the issue up front.

In the works but now on hold—regional needs assessment mechanism that could produce results to be updated every couple years.

Need to build those skill sets, maybe model for training could be developed.

PNW CESU initiatives, Gordon and Chris

Newsletter—

Suggestion: instead of conventional PDF, move from static web site to dynamic format, but this process is complex, and requires design capability. Maybe should be done at national level and then distributed to regional units. How to host? If hosted by national office, units could tap into that, and this assures consistency across units. In the meantime, PNWCESU do something in between?

Strategic plan—

Do we want to revise the current strategic plan? Is there a point to revising the strategic plan to guide our activities if what guides us are the missions of the federal partners and the priorities of the university members? We could incorporate today's theme of integrating cultural and natural resources research into a new strategic plan. A strategy of simple revision could provide buy-in and actually function as a guiding document.

Over the next five years, if CESU envisions participating in the LCCs, and working more with minority-serving institutions, we can incorporate those goals into a new strategic plan, with annual work plans.

A new document might be more realistic now because we've existed ten years and the partners have better understanding of CESU capabilities. It should be specific.

Minority service institutions—

They don't have graduate programs, therefore no research faculty or programming. Just having minority-service institutions as members doesn't involve them in projects. We must develop a new strategy for the strategic plan and evaluate its effectiveness after five years.

Communication—
CESU should develop strategies for video-conferencing capability to include more meeting participants (e.g., students) and save energy. The first attempt could be a meeting on the strategic plan, not an annual meeting. In May or June to keep momentum going?

Suggestion to do quarterly activities such as teleconference meeting, physical meeting, video meeting, submission of articles for newsletter. Each quarterly activity yields a product. We will get stronger buy-in from stakeholders.

Proposed: Do video meeting in June on strategic plan to incorporate info from today's mtg.

One event (joint summit) to address strategies for minority inclusion. One to produce newsletter.

Priority issues

1. Strategic plan/annual work plan

Do we want to revise the current strategic plan? Is there a point to revising the strategic plan to guide our activities if what guides us are the missions of the federal partners and the priorities of the university members? We could incorporate today's theme of integrating cultural and natural resources research into a new strategic plan. A strategy of simple revision could provide buy-in and actually function as a guiding document.

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2. Recruitment of minority-serving institutions

One goal identified in the self-assessment and earmarked by the national review committee is to increase participation of minority-serving institutions in our unit and recruit more such institutions to our membership.

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3. Communication

A. Newsletter

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B. Meetings

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4. Internship coordination

LCCs could a create model for student research and internships at LCCs for students, NGOs, and tribes. CESUs can provide a link to universities. The CESU could develop and streamline a program for internships offered by agencies, acting as the link between the universities and agencies.

5. Outreach and marketing

The CESU Network must gain a stronger presence in all these agency initiatives. Visibility and awareness is an issue for CESU. LCCs can use CESUs as a mechanism that provides an alternative to contracting, providing the criteria of the cooperative agreement are met. Talk to agency staff. Get buy-in for the existing CESU program instead of developing a new program. Remember the cost efficiencies of the indirect cost rate negotiated by CESU. Grants.gov is being used inconsistently across agencies. NOAA wants more competition in the CESU process. Posting, solicitation, and competition are interpreted differently across agencies.

BLM CLIMATE CHANGE ACTIVITIES

CESU ANNUAL MEETING

PORTLAND, OREGON

APRIL 29, 2009

THE BASIS FOR DOI AND BLM CLIMATE CHANGE ACTIVITES

- FY 2009 and 2010 Appropriation Acts and Conference Reports
- E.O. 13514 on Federal Leadership in Environmental, Energy, and Economic Performance (October 5, 2009)
- CEQ's Draft Framework for Coordination of Federal Land Management Agencies to Address Climate Change
- CEQ's Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions
- President's Memorandum on a Comprehensive Federal Strategy on Carbon Capture and Storage (February 3, 2010)
- Secretarial Order 3289 Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources (September 14, 2009)
- DOI High Priority Performance Goals for FY 2010

In 2009, a climate change bill was passed in the U.S. House of Representatives (H.R. 2454); a similar bill was drafted in the U.S. Senate. These are lengthy bills addressing emissions reductions, carbon capture and sequestration, nuclear and other advanced technologies (including natural gas and coal), water use efficiency, recycling, renewable energy including biofuels, green jobs, worker transition assistance, and natural resource conservation and adaptation.

Sections 341-384 of the Senate draft include 90 pages addressing "Domestic Adaptation." If enacted into law, these sections (and similar sections in the House bill) would require much of the regional assessment, collaborative planning, science development and integration, and other adaptation-related work that is already underway within the BLM, DOI, CEQ, and other agencies.

SUMMARY OF DOI DIRECTIVES

- *Analyze potential climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, developing multiyear management plans, and making major decisions regarding potential use of resources.*

- *Management responses to climate impacts must be coordinated on a landscape-level basis.*

SUMMARY OF DOI DIRECTIVES

- *Quantify the amount of carbon stored in our lands, identify areas where CO2 can be stored underground, and develop carbon sequestration methodologies for biological and geological carbon storage.*

- *Promote environmentally responsible energy development.*

SUMMARY OF DOI DIRECTIVES

- *Develop science-based adaptive management strategies and tools to address the impacts of climate change on our natural and cultural resources.*

DOI/BLM Climate Change Strategy

TWO BASIC ELEMENTS

MITIGATION: ACTIONS TO MINIMIZE CLIMATE CHANGE

ADAPTATION: ACTIONS TO PREPARE FOR CLIMATE CHANGE

MITIGATION

- Promoting renewable energy development
  - Solar, wind, geothermal, biomass
- Reducing our carbon footprint
  - Reducing agency GHG emissions
  - Reducing GHG emissions from authorized uses
- Carbon sequestration
  - Biological
  - Geological

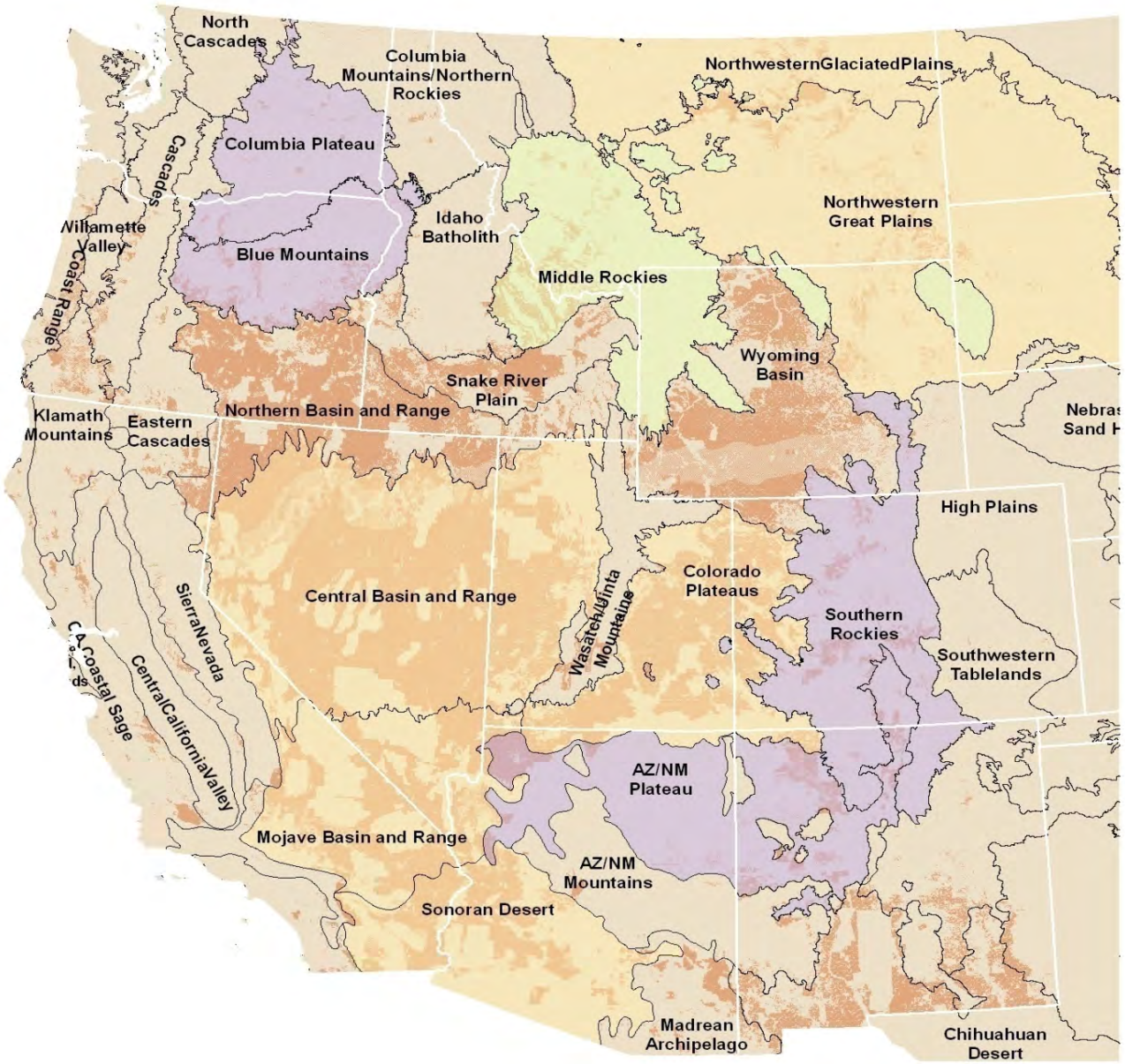
ADAPTATION

- Obtaining down-scaled climate projections
  - NOAA Regional Climate Science offices
- Modeling regional impacts to resources and users
  - DOI Regional Climate Science Centers
- Determining and implementing responsive changes
  - Each agency, organization, private landowner – through nested, landscape-scale collaborations including Landscape Conservation Cooperatives (LCCs)
- Monitoring and adapting
  - CEQ is working with DOI, DOA, and DOD to foster a unified, multi-scale monitoring approach

ECOREGIONAL ASSESSMENTS

- BLM will conduct a series of ecoregional assessments beginning in FY 2010
- Driven in part by landscape-scale concerns about impacts to resources from renewable energy siting
- Designed to help address other landscape-scale concerns, including invasive species, altered fire regimes, and climate change

ECOREGIONAL ASSESSMENTS



BLM Lands

Start Year

2010

2010 Pre-Assessment

2011

BLM – Rapid Ecoregional Assessment

- Rapid/No New Data Collection
- GIS Based
- Interdisciplinary and Collaborative – Multiple Agencies and Stakeholders
- Define and Refine Management Questions
- Identify Goals and Objectives at Ecoregional Scale

Rapid Ecoregional Assessment

- Resource Values (status, risk and trend)
  - Native fish, wildlife and plants of conservation concern
  - Aquatic resource values
  - Terrestrial resource values
- Change Agents
  - Wildland Fire
  - Development (e.g., urban, industrial)
  - Invasive, non-native species
  - Climate Change
- Vulnerability Assessment

Rapid Ecoregional Assessments

- *Proposed Process:*
- Conduct rapid assessments
- Formulate eco-regional management strategies
- Conduct sub assessments as needed
- Develop conservation strategies
- Consider RMP Revisions/Amendments
- Implement conservation, restoration and adaptation actions
- Carry out inventories, research, monitoring and reporting

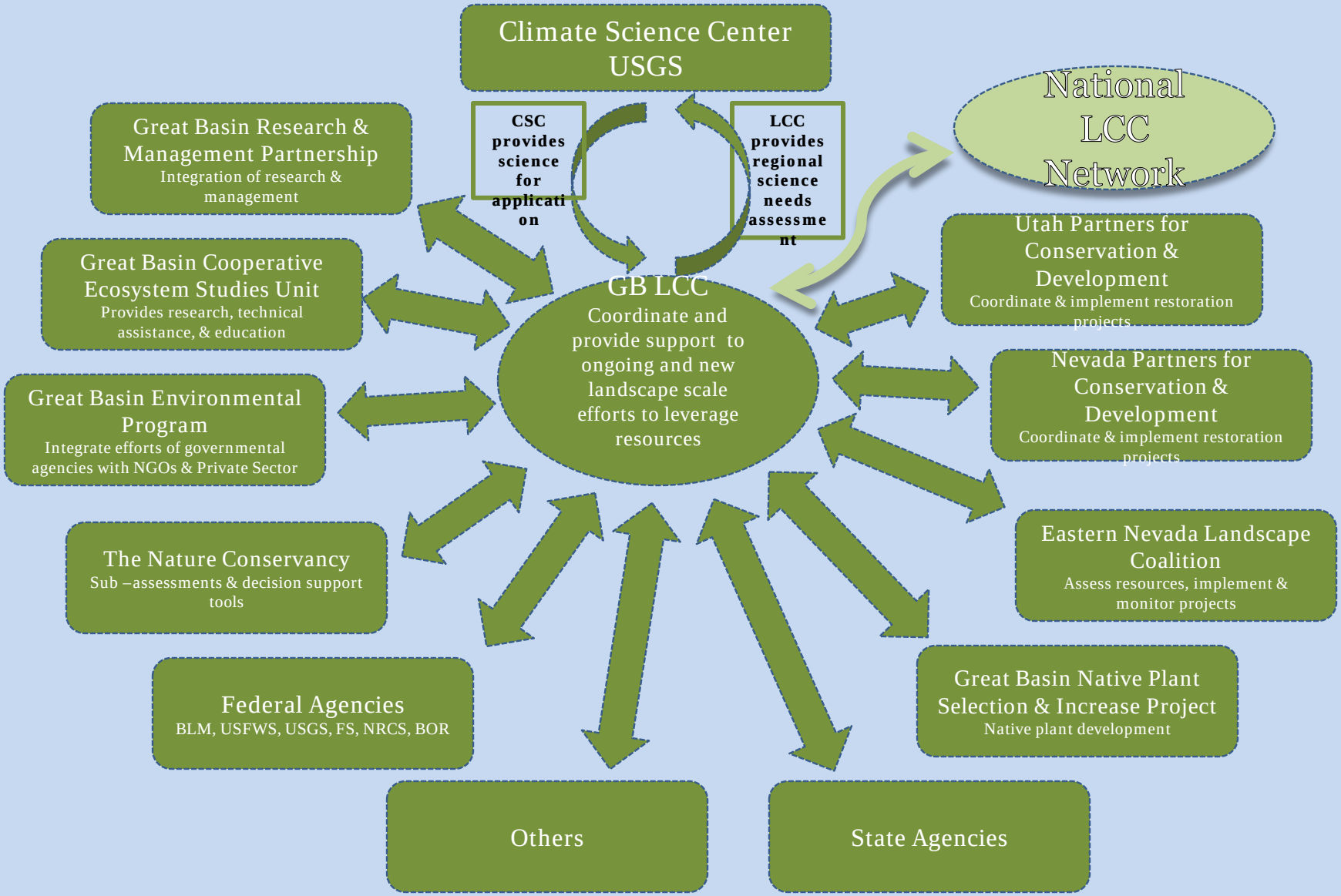
ECOREGIONAL STRATEGIES

- Assessments will lead to landscape-scale strategies for conservation, restoration, renewable energy siting, and other purposes
  - Northern Great Basin and Chihuahuan Desert are pilot areas for developing ecoregional management goals, objectives, and responsive actions
- Integrated, multi-agency, collaborative exercises
- Future landscape-scale strategies may be facilitated by LCCs, developed and implemented through nested collaborations

GREAT BASIN LCC

- BLM has initiated discussions to take the lead for the Great Basin LCC.
- Initial meetings in Boise, Salt Lake City and Reno in the next few weeks

Great Basin Landscape Conservation Cooperative Organizational Concept



Oregon/Washington
Climate Change Strategy

Vision:

Minimize and mitigate the impact of climate change on our resources and adapt our actions accordingly

Climate Change Partnerships

Oregon/Washington BLM

Climate Science Center
USGS

National
LCC
Network

EPA

BLM

USGS

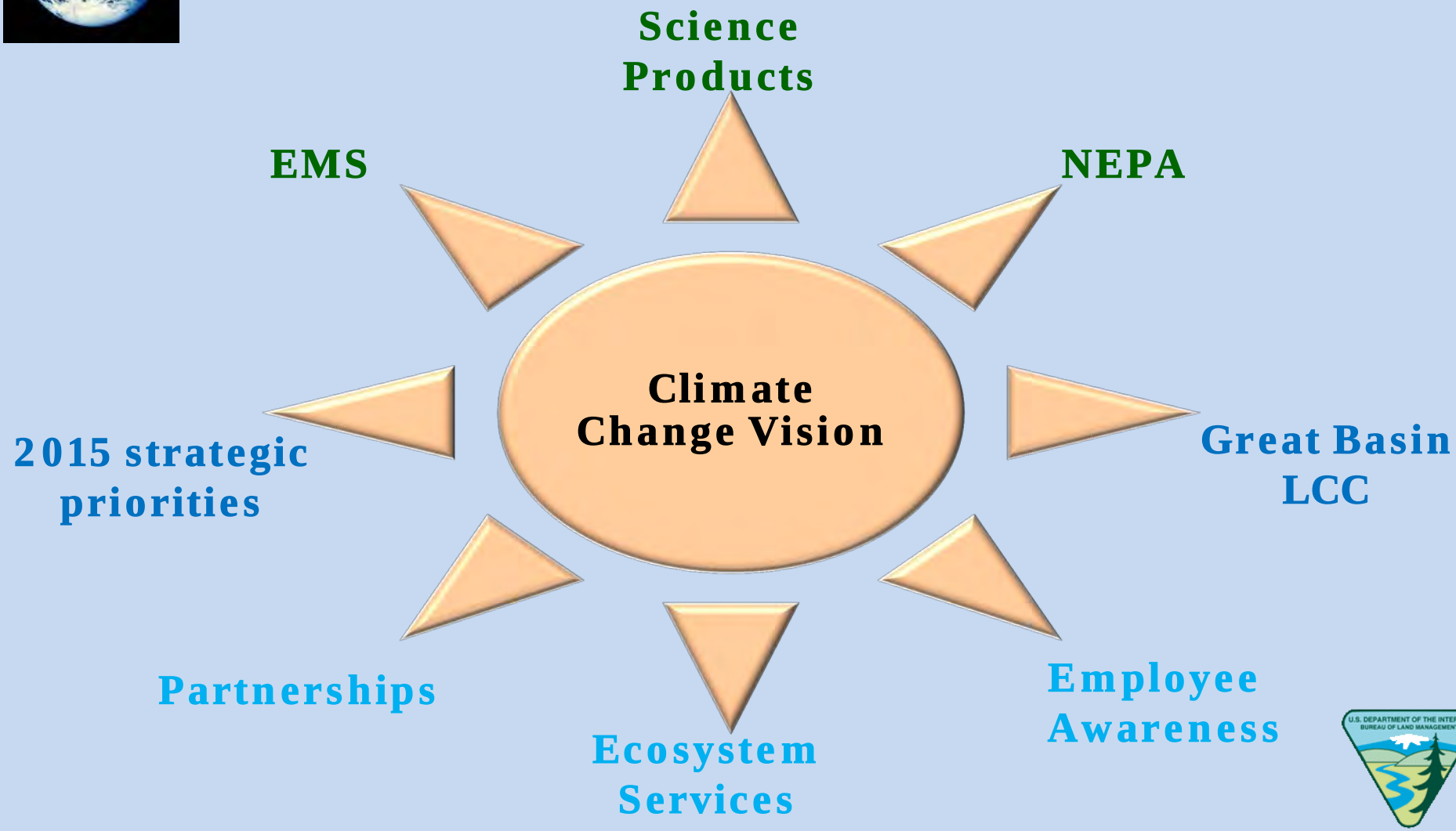
OR/WA Climate Change Strategies

USFS

USFWS

State Agencies

Oregon/Washington BLM Climate Change Strategy 2010 work



Climate Change Strategy
Oregon/Washington BLM

- **EMS/SUSTAINABLE OPERATIONS**

Green Procurement, Hazardous Materials Management.

Invasive Plant Management, Sustainable Operations Team

NEPA

- Provide NEPA guidance related to climate change, specifically on: Affected environment, "significance"
  - Quantification of climate change impacts associated with BLM actions in NEPA documents
  - Consideration of Programmatic EIS

Climate Change Strategy
Oregon/Washington BLM

Science Products

- #1 Climate Change Synthesis- will have bi-annual updates to remain relevant

- #2 Downscaling- Consideration of a downscale model that summarizes thousands of simulated models to provide statistically valid answers to key questions

- #3 GHG Model paradigm- Including partnership with OWEB and Ecotrust for GHG related projects on the Eastside

Climate Change Strategy
Oregon/Washington BLM

EMPLOYEE AWARENESS

- **FY10 Goals**
  - Enhance climate change awareness within OR/WA BLM
  - Develop a common understanding, use common terminology, increase employee awareness & education
  - Provide guidance to Program managers to better assist the field with Climate Change information and analysis relevant to their area of expertise
  - Ecosystem Services

BLM – Forest Service BUSINESS NEEDS ASSESSMENT

TERRESTRIAL PRIORITIES

- Synthesize climate change outputs for vegetation – scale, new models
- Fill gap for Klamath Basin downscaling
- Develop bioclimatic envelopes for understory species, especially in rangelands
- Develop projections for changed fire regimes in all ecosystems
- Simulate new habitat distributions

BUSINESS NEEDS ASSESSMENT

AQUATIC/WATERSHED PRIORITIES

- Conduct a low flow risk assessments
- Determine groundwater effects on stream hydrographs
- Develop and apply stream temperature models for current and future climates
- Simulate new habitat distribution for aquatic species

Climate Change Issues

- Defining the “Right” Management Questions
- Baseline
- Factors Influencing Groundwater
- Data Accessibility
- Decision Support Models
- Integration Within and Across Agencies and Other Stakeholders (Buy In)

THANK YOU

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Research Liaison

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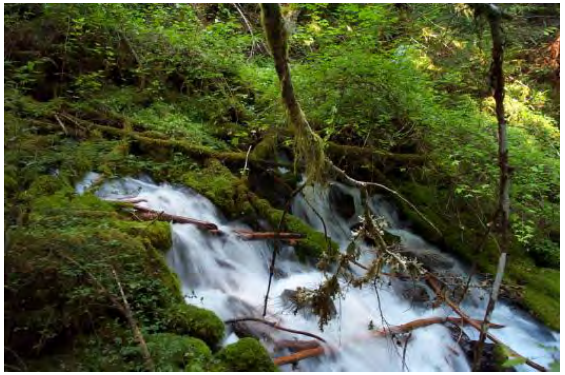
Science You Can Use

The Climate Change Research Program at the US Forest Service Pacific Northwest Research Station

John Laurence
US Forest Service Research & Development
Pacific Northwest Research Station
Portland, Oregon

FS R&D
PNW Research Station



About the PNW Research Station

- *Part of USDA Forest Service Research and Development*
- *11 Locations in Oregon, Washington, and Alaska*
- *11 Experimental Forests*
- *5 Fundamental Research Programs*
    - *Ecosystem Process and Function*
    - *Land and Watershed Management*
    - *Resource Monitoring and Assessment*
    - *Threat Characterization and Management*
    - *Goods, Services, and Values*

- *Western Wildland Environmental Threat Assessment Center*
- *Focused Science Delivery*

FS R&D
PNW Research Station

FS R&D
PNW Research Station

Our Context vis à vis Climate Change

We carry out fundamental and applied research to further basic understanding of ecosystems and how people use them, and we support land managers by providing science, synthesis, and interpretation

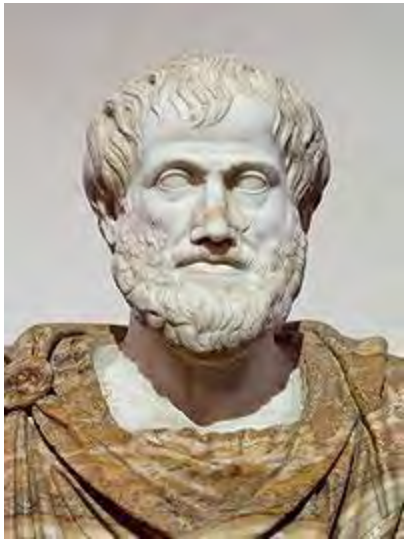
What changes in the function of forests and rangelands will be driven by changes in climate?

What management options are available to mitigate those impacts?

FS R&D
PNW Research Station

Climate Change Program at PNW Station

Earth
Air
Fire
Water



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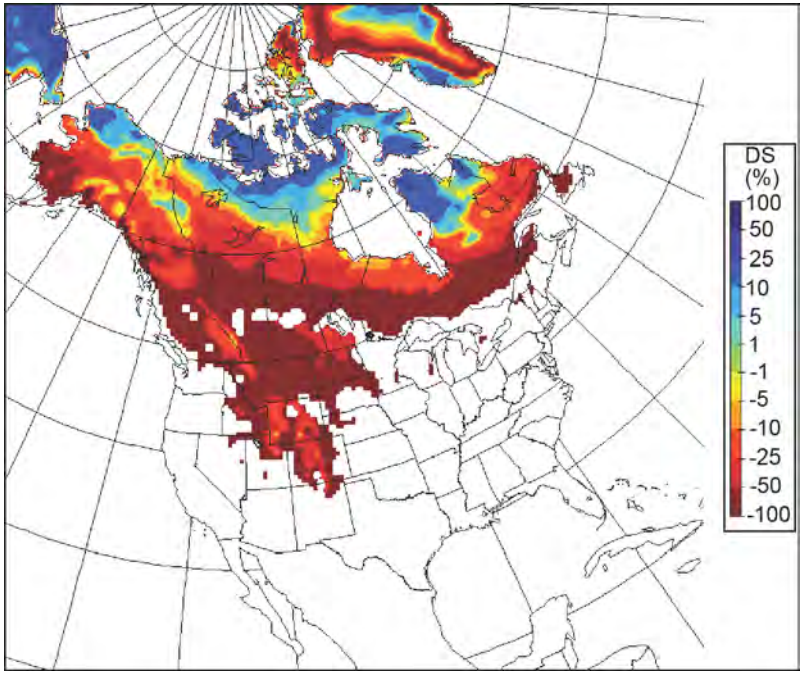
FS R&D
PNW Research Station

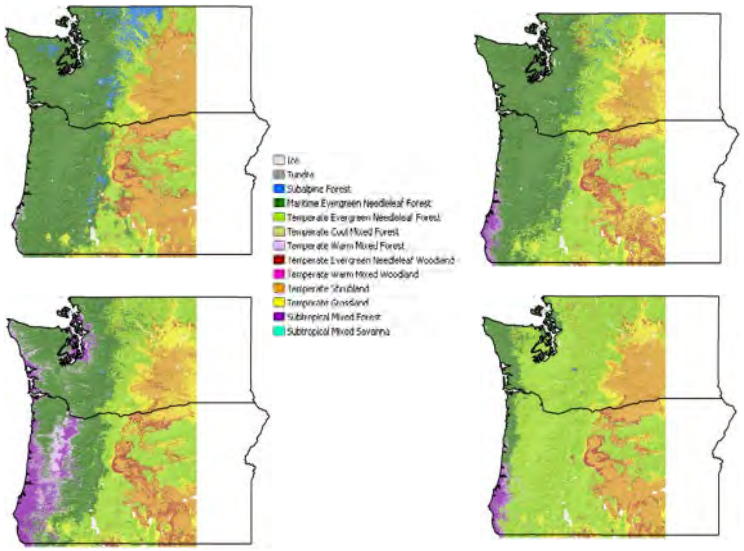
Main Foci of PNW Climate Change Research

- *Translation of climate projections to the ground including vegetation succession trajectories*
- *Landscape Processes–Maintaining or Restoring Function*
- *Water*
- *Wildlife and Fish habitat*
- *Fire*
- *Insect and Disease dynamics*
- *Community and social dynamics*
- *Tribal concerns*
- *Ecosystem services and environmental economics*

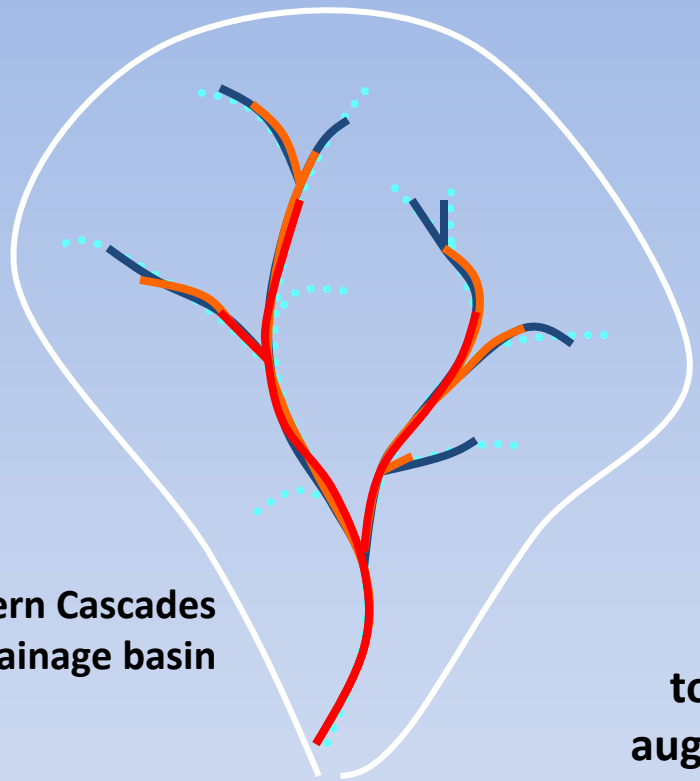
Percentage change in March snow depth (2041-2070 vs. 1961-1990)



What's predicted to happen?

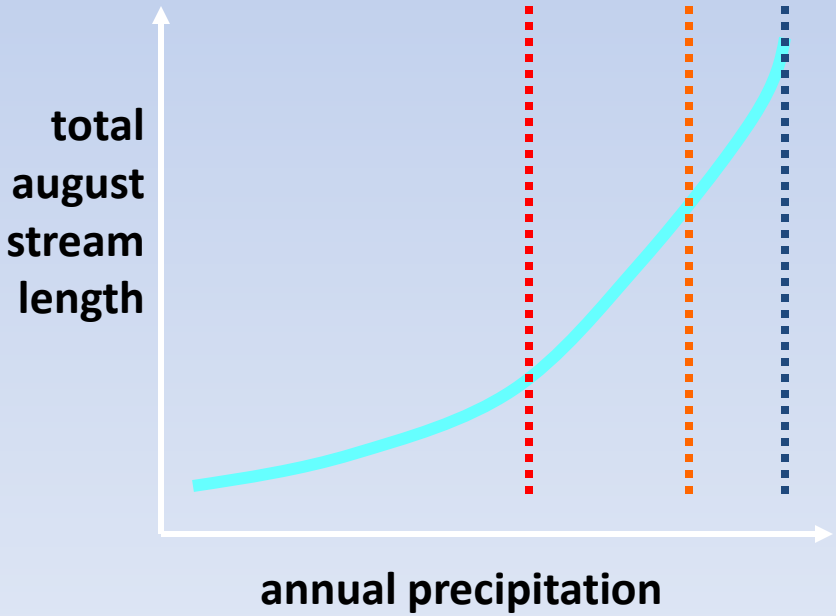


FS R&D
PNW Research Station



wet year
average year
dry year

Western Cascades drainage basin

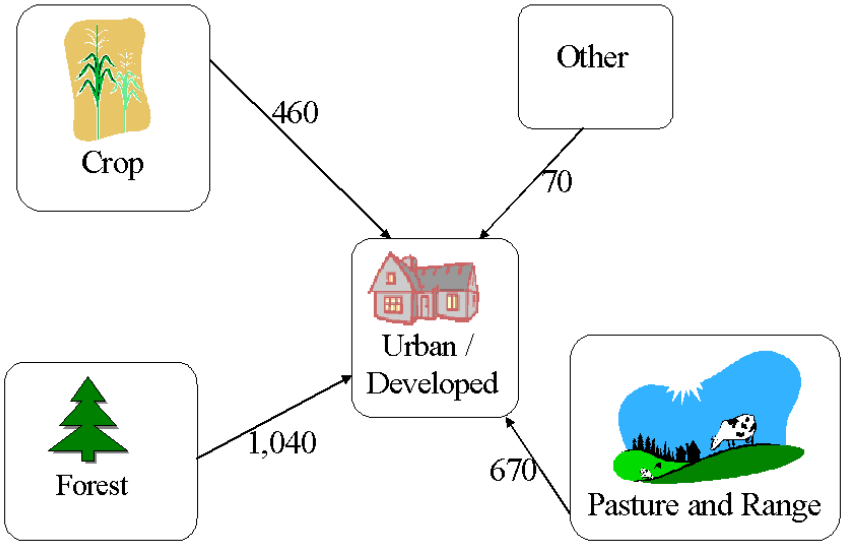


Even a small reduction in low flow discharge can result in a large decrease in stream length

FS R&D
PNW Research Station

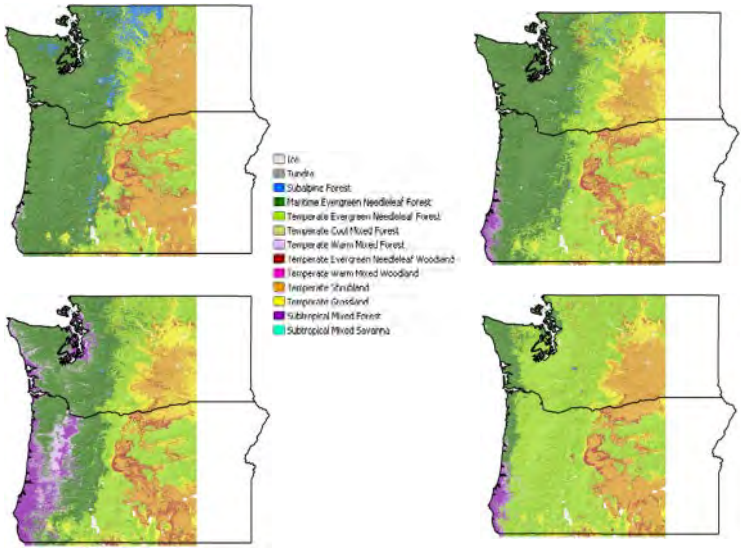
Increasing pressure on natural resources

CCX Chicago Climate Exchange



Annual losses of open space to urban uses: 1997-2001

FS R&D
PNW Research Station



What changes in the function of forests and rangelands will be driven by changes in climate?

What management options are available to mitigate those impacts?

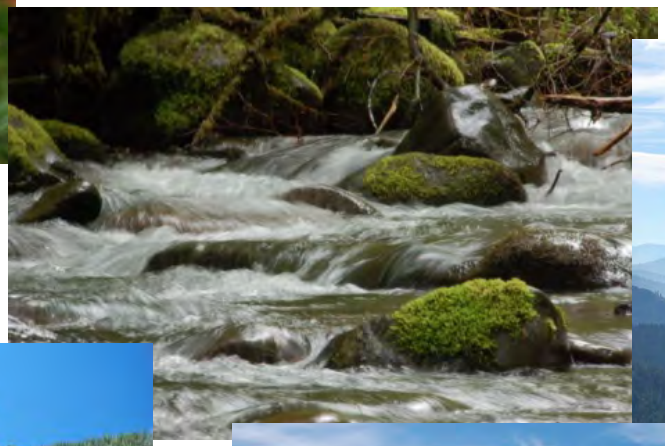
Down-scaled Climate Models and Resulting Trajectories of Vegetation Succession

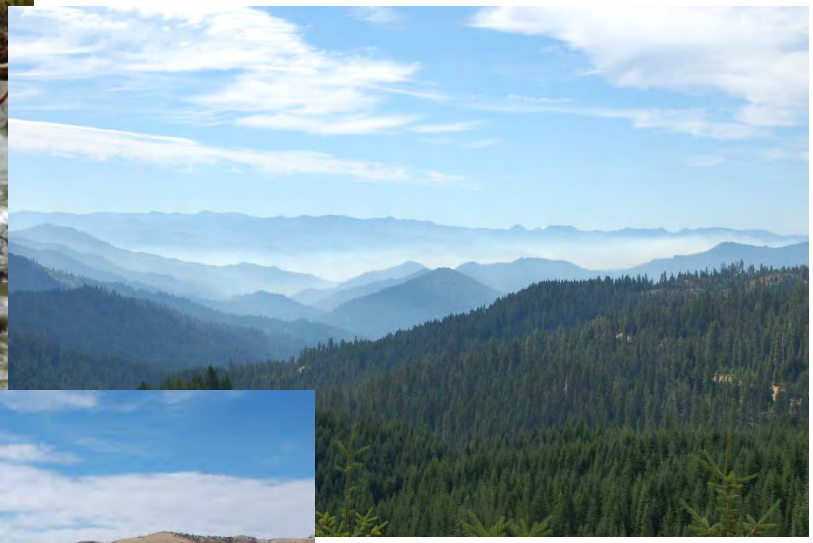
FS R&D
PNW Research Station

What changes in the function of forests and rangelands will be driven by changes in climate?

What management options are available to mitigate those impacts?

Landscape Processes Maintaining or Restoring Function





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Water
Cool, Clear Water

What changes in the function of forests and rangelands will be driven by changes in climate?

What management options are available to mitigate those impacts?

FS R&D
PNW Research Station

What changes in the function of forests and rangelands will be driven by changes in climate?

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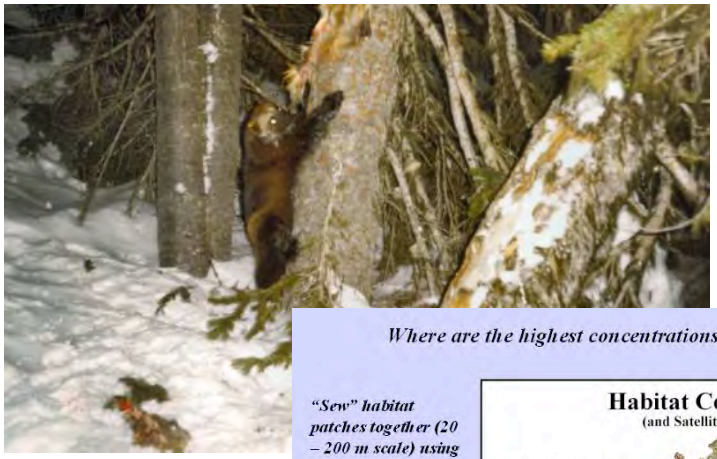


Where are the highest concentrations of habitat located?

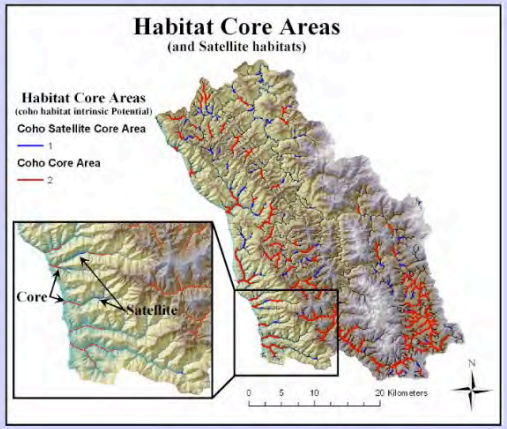
"Sew" habitat patches together (20 – 200 m scale) using thresholds for

-habitat quality

-habitat size

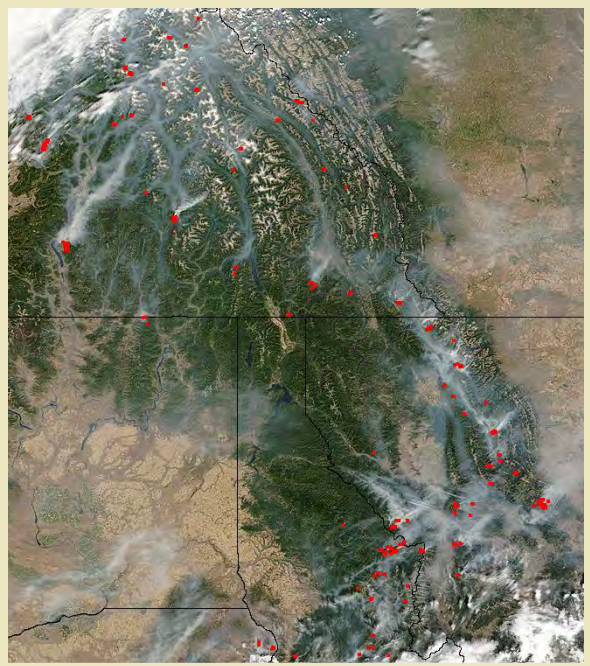
-habitat proximity

to create habitat "core areas" or "anchor habitats"



Wildlife and Fish Habitat

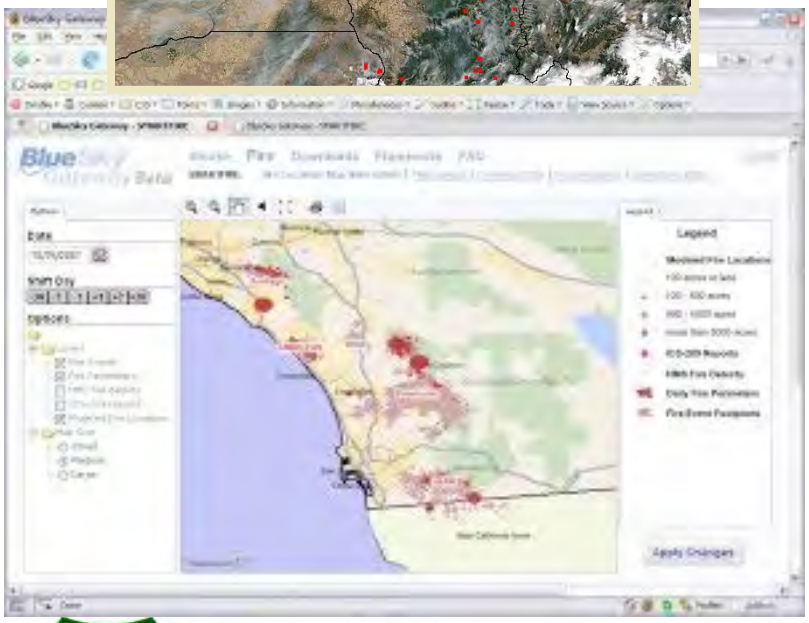
FS R&D
PNW Research Station



What changes in the function of forests and rangelands will be driven by changes in climate?

What management options are available to mitigate those impacts?

Fire Effects
Smoke Modeling and Forecasting



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What changes in the function of forests and rangelands will be driven by changes in climate?

What management options are available to mitigate those impacts?

Insects and Disease

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Community Dynamics

What changes in the function of forests and rangelands will be driven by changes in climate?

What management options are available to mitigate those impacts?

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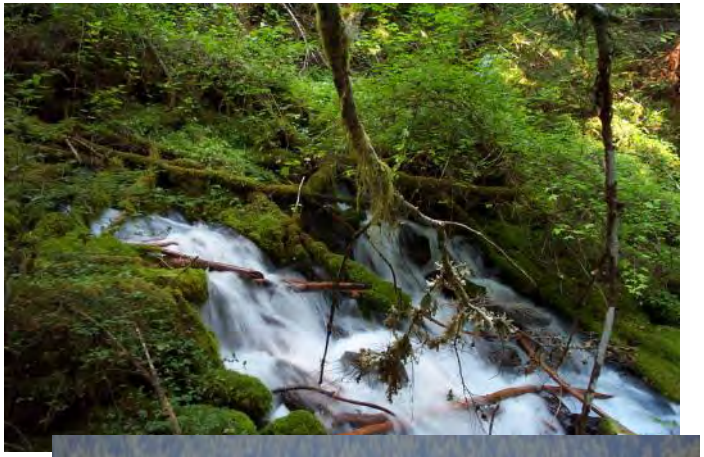


VALUING ECOSYSTEM SERVICES

Changes in Ecosystem Services

FOREST SERVICE U S DEPARTMENT OF AGRICULTURE

FS R&D
PNW Research Station

John Laurence
503-808-2191
jalaurence@fs.fed.us

FS R&D
PNW Research Station

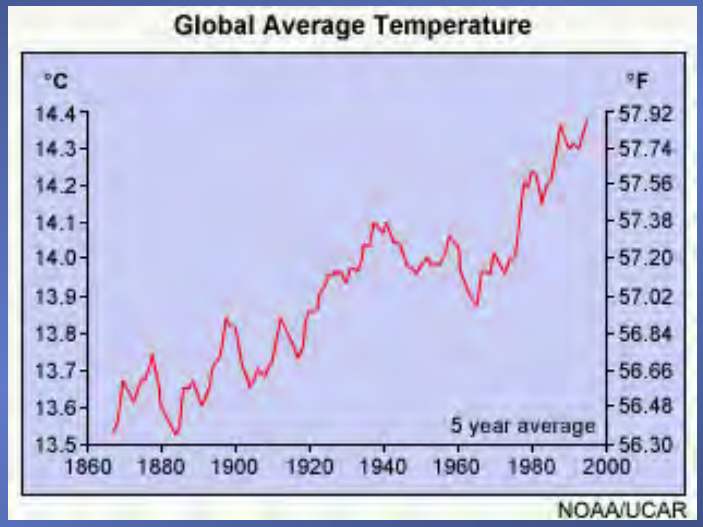
Science You Can Use

U.S. Fish & Wildlife Service

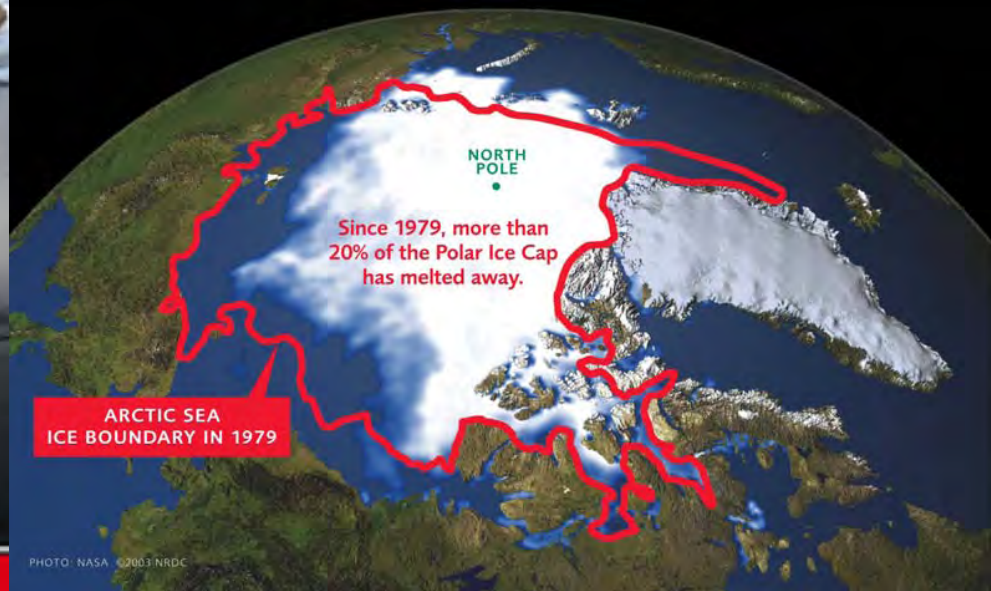
USFWS Climate Change Efforts

2010 PNW CESU
Annual Meeting
April 29, 2010

Stephen Zylstra, PhD.
Regional Landscape Conservation Manager
Pacific Region – Science Applications Program



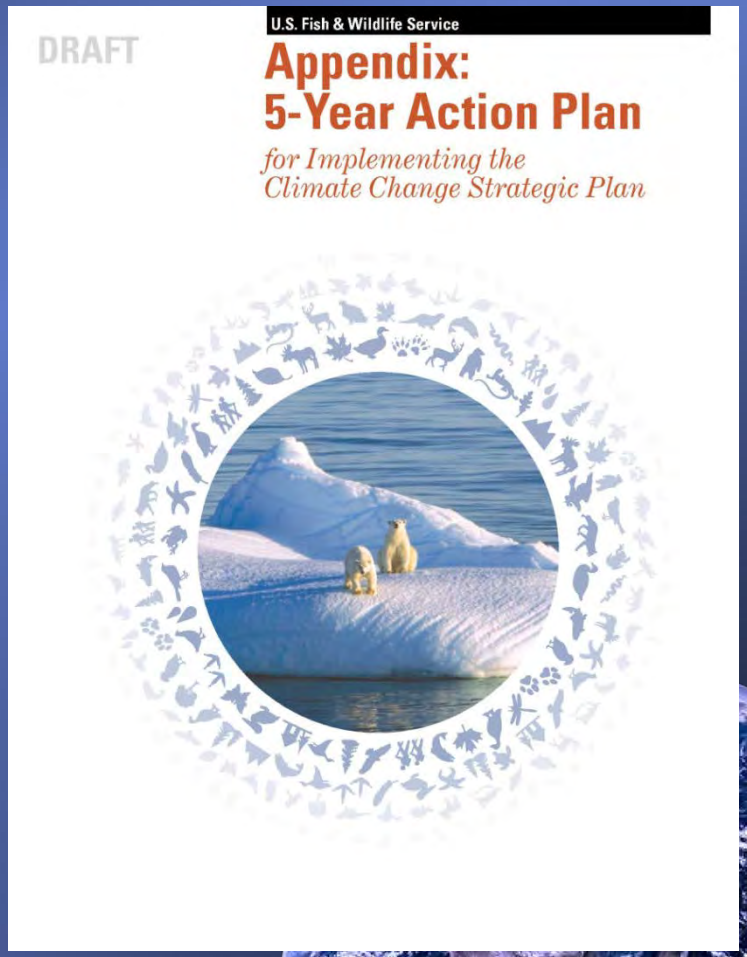
Rapidly Melting Sea Ice



Major Climate Change Effects

- Extreme weather patterns (wetter/drier)
- Decreased snow pack
- Water cycles altered (early spring, temp increase)
- More frequent and intense wildfires
- Range shifts in ecosystems/habitats
- Invasive species outbreaks
- Sea level rise (habitat loss, flooding)
- Ocean acidification

USFWS Climate Change Strategic Plan



http://www.fws.gov/home/climatechange/

comment period ended November 30

Climate Change Strategic Plan

- Focused in three areas
  - Adaptation – reduce impacts
  - Mitigation – reduce levels of greenhouse gases
  - Engagement – reaching out
- Identifies priority strategies and actions
- Adopts SHC or landscape conservation approach
- Introduces concept of Landscape Conservation Cooperatives
- National and Regional Climate Teams
- Science Applications Program

Landscape Conservation Cooperatives

- Applied science partnership focused on a defined geographic area
- Provide scientific and technical expertise to understand climate change and other major system stressors
- Serve as a national network for shared science capacity to support natural resource managers
- Inform strategic efforts at landscape scales to be used in conservation planning and delivery

Preliminary LCC Concepts

- Science partnerships within a geographic area
  - State, Provincial, and Federal agencies, Tribes, NGOs, Universities
- Rely on and support existing partnerships
- Guided by a Steering Committee
  - Provide management direction and identify priorities
- LCC Coordinator/Science Coordinator
- Shared science capacity
  - Science, technology, data management
- All species and all habitats
- Leverage funding and expertise
- Link science with natural resource managers' needs

LCC Process

- Applies technical elements of adaptive management framework, such as Strategic Habitat Conservation
- Develops products to inform on the ground conservation delivery

- Directs science capacity towards conservation priorities across landscape
- Leads respective implementation capacity as per collective priorities

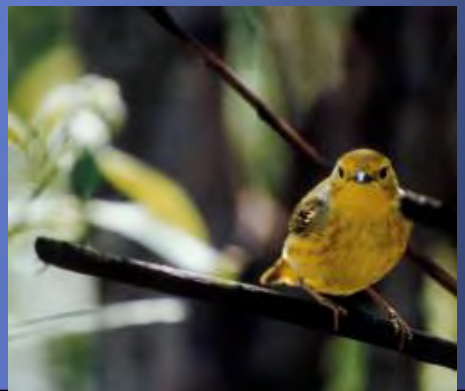
- Works with science capacity to refine science and decision support needs
- Ensures on the ground conservation delivery consistent with respective missions

Science Capacity

- DOI Climate Science Center (PNW)
- USGS Science Centers (FRESC and NoRock)
- USFS - PNW Research Station/WWETAC
- NOAA Climate Service
- University of Washington Climate Impacts Group (CIG)
- Oregon Climate Change Research Institute (OCCRI)
  - Regional Integrated Science and Assessments (RISA) for the Northwest
- 5-year grant to Idaho Universities
  - National Science Foundation - EPSCoR
- Pacific Institute for Climate Solutions in British Columbia

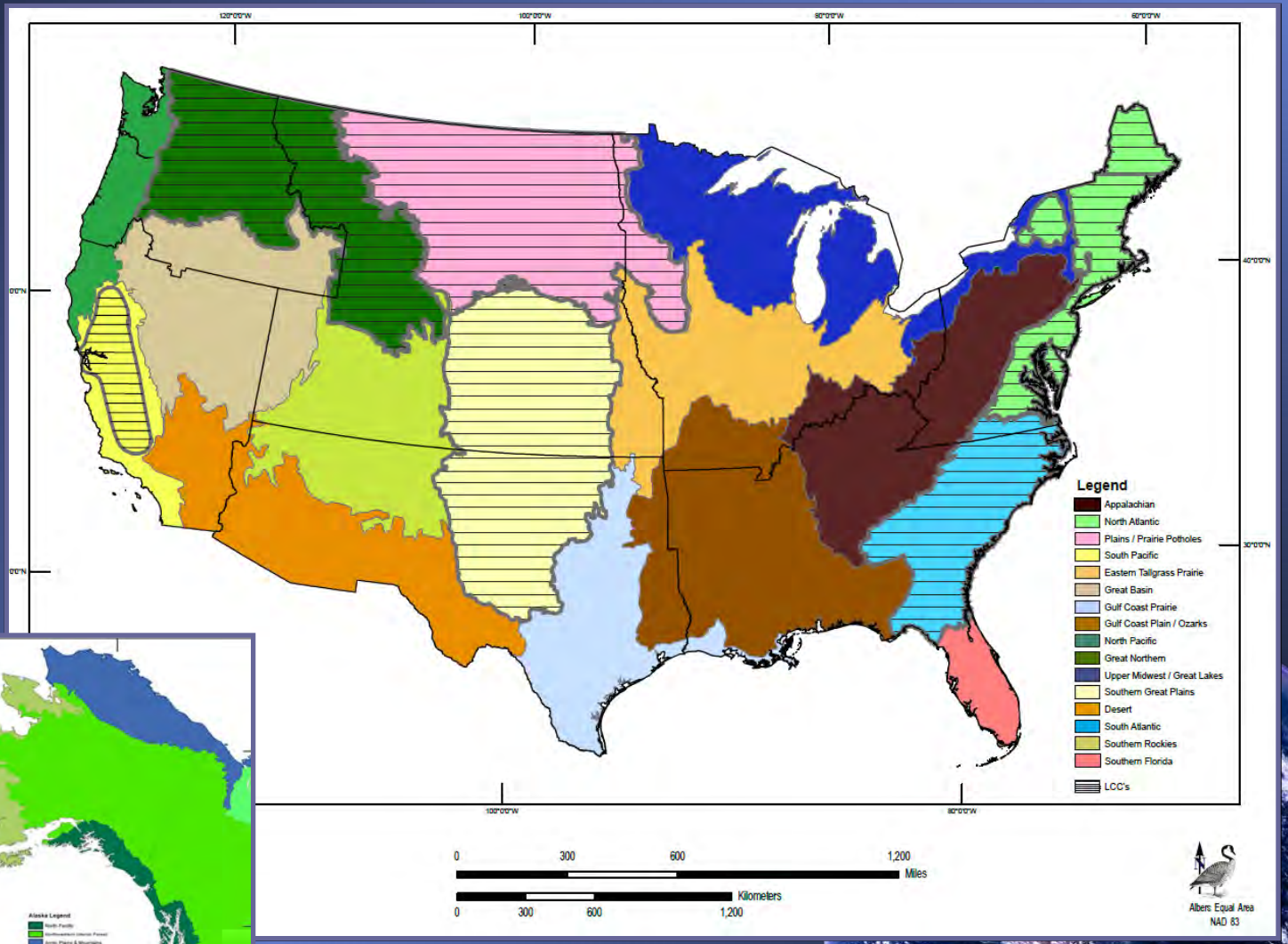
What will LCCs Do?

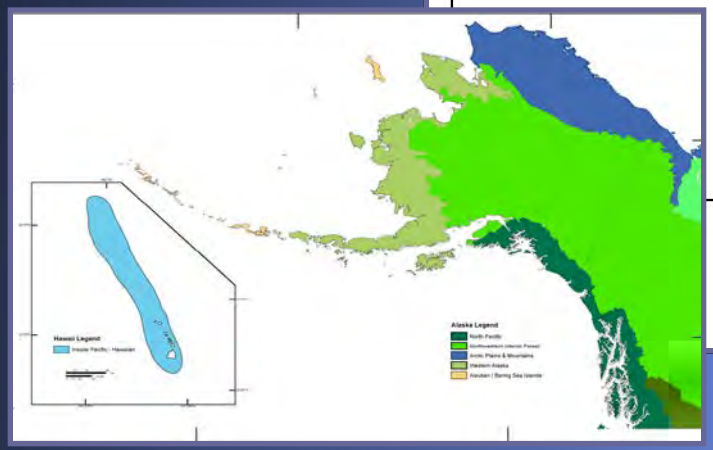
- Identify and address scientific information needs
- Facilitate better understanding of habitat response and species distribution to ecological process changes
- Inform landscape-scale conservation and management decisions
- Forum for sharing information and resources



LCC Geographic Framework

- 22 LCCs
- 8 initiated in FY2010





Potential LCC Outcomes

- Maps of sensitive species and habitats
- Down-scaling of regional climate change models to local communities/populations
- Potential range shifts of native and invasive species
- Vulnerability assessments for species and habitats
- Potential refugia and priorities for land acquisition
- Potential corridors linking present and future habitat
- Convergence of climate and non-climate stressors
- Inventory and monitoring strategies
- Data sharing

Pacific Region LCCs

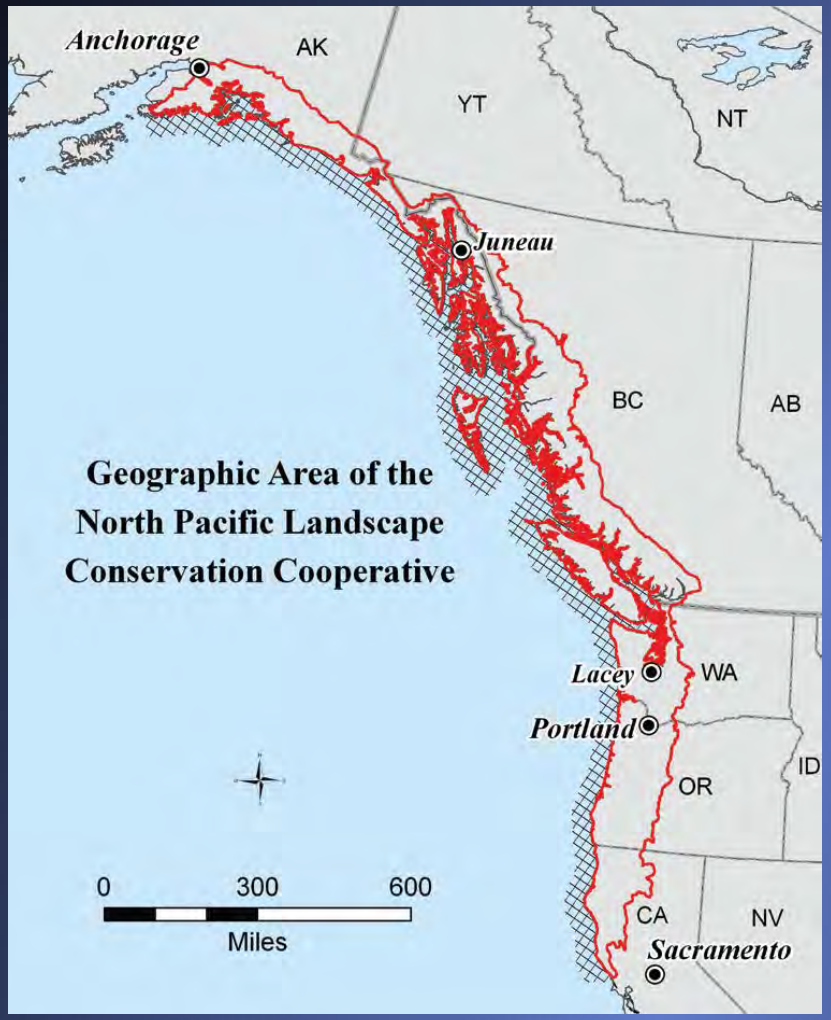
FY2010

- Pacific Islands
- Great Northern

FY2011

- North Pacific
- Great Basin

North Pacific LCC



Includes:

Alaska
Washington
Oregon
California
British Columbia

- Extends over 2,200 mi. (3,500 km) from north to south
- Approx. 204,000 sq. mi. (530,000 sq. km.)
- Ocean boundary not defined

North Pacific LCC

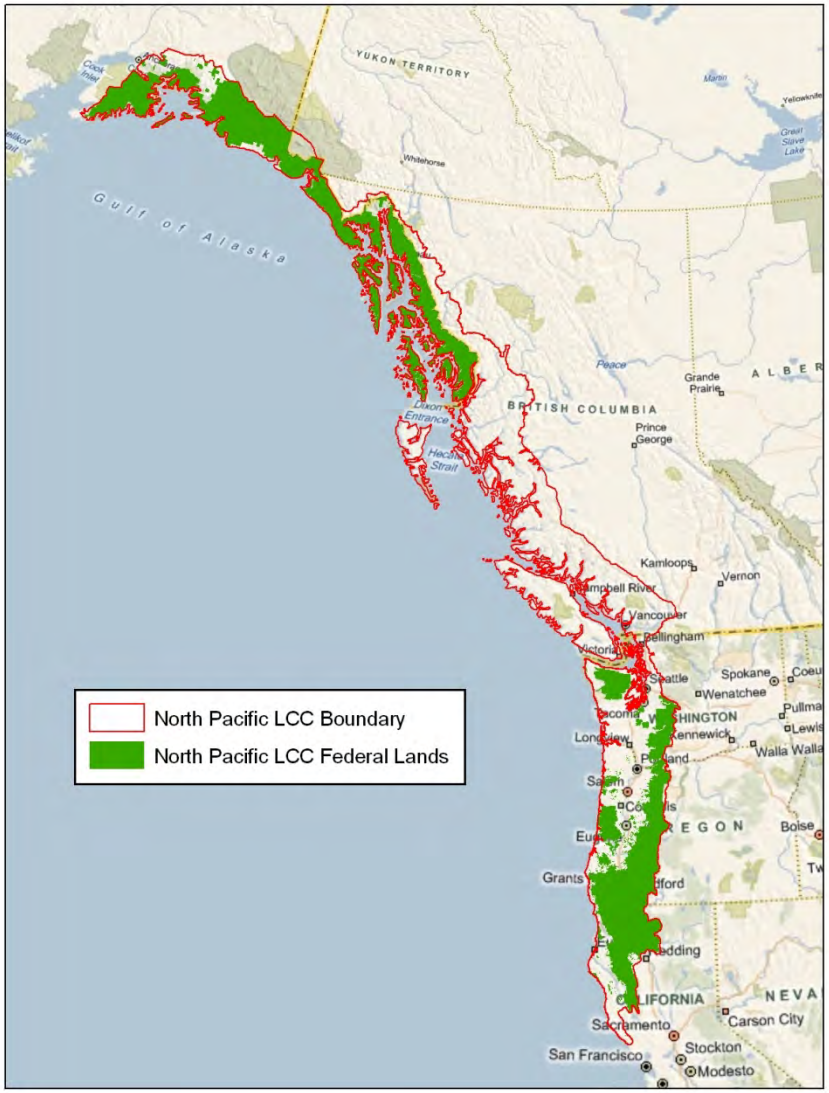
Protected Lands

Identified on Map:

- Over 82,000 sq. miles (approx. 213,000 sq. km) of U.S. Federal lands

Not Shown on Map:

- Additional State, Provincial, Canadian Federal , Tribal, and NGO lands



Northern Pacific LCC

- Early initiation in FY2010
- Potential Partners
  - U.S. State and Federal Agencies
  - Canada Federal and Provincial Agencies
  - Tribes, First Nations
  - NGOs (e.g., TNC, NWF, Defenders)
  - Partnerships (e.g., PCJV, PSP)

Northern Pacific LCC – Next Steps

- Webinars in May
- Additional dialog with partners
- Meeting with State wildlife agencies
- Summer planning meetings with all potential partners
- Identifying management or conservation questions
- Identifying science needs
- Planning Information gap analysis

Summary

- Climate change is greatest challenge in the history of conservation
- Primary function of LCCs is providing and sharing science support for resource managers
- CESU can support science capacity needs

Climate Change Research: MMS Alaska OCS Region

Heather A. Crowley, Ph.D.
Oceanographer
Environmental Studies
MMS Alaska OCS Region
April 2010

MMS Securing Ocean Energy & Economic Value for America

Outline

- ESP Background
- Climate Change Research at MMS
  - Ongoing studies related to climate change
  - Studies proposed for FY 2011 and FY 2012
  - Topical areas for future studies
- The Alaska OCS Region Environmental Studies Plan
- FedBizOpps.gov

ESP Background

- National in scope: AK annual budget ~$12M
- Multi-disciplinary (staff of 10)
  - Oceanography: circulation, sediments, discharges
  - Biology: marine mammals, fish, birds, flora
  - Social Sciences: subsistence, culture, economics
- Peer review
  - OCS Scientific Committee Advisory Board
  - Science Review Boards
  - NAS reviews
  - Published reports
  - Stakeholder Review
- Transparency
  - Annual Plan, ITMs, website, final reports <www.mms.gov/alaska/ess.htm>

Studies Webpage

Environmental Studies Program, Alaska OCS Region - Windows Internet Explorer

http://www.mms.gov/alaska/ess/index.htm

File Edit View Favorites Tools Help

Environmental Studies Program, Alaska OCS Region

Home | Search | Site Map | About MMS | What's New

MMS

Minerals Management Service
Alaska OCS Region

U.S. Department of the Interior

- Upcoming Events
- Current Activities
- Reading Room
- Environmental Studies
- Leasing Activities
- Resource Evaluation
- Offshore Information
- Alaska Native Links
- Shipwrecks
- Kids Corner
- Other Regions
- Forms
- Public Comments
- FOIA
- Privacy Act/Disclaimer

USA.gov

Questions?
Need More Information?
Please Write:
Alaska Region Public Information

This page last updated:
03/05/2010

Environmental Studies Section

The Minerals Management Service (MMS) Environmental Studies Program began in 1973 as a means to gather and synthesize environmental, social, and economic information to support decision making for the offshore oil and gas program. Since its beginning, the National Environmental Studies Program has contracted for more than $600 million dollars of studies throughout the coastal zone of the continental United States. These funds have supported studies of all aspects needed for a thorough understanding of the complex nature of the Alaskan Outer Continental Shelf and have aided in the wise protection of its valuable resources. The MMS uses information from the studies program in evaluating potential environmental problems associated with all levels of oil and gas activities.

- Alaska Annual Studies Plan FY 2010
- Aerial Surveys of Endangered Whales, Bowhead Whale Aerial Survey Program (BWASP)
- Coastal Marine Institute Annual Reports
- Ongoing Studies
- Completed Studies
- Results of Completed Studies Available on the Web
- Environmental Studies Program Information System (ESPIS)
- Proceedings of Alaska Region Information Transfer Meetings
- Information of Interest to Offerers
- Links to Other MMS Environmental Studies Sites
- International Polar Year 2007 - 2008
- Posters, Presentations & Proceedings

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Topic Index | Freedom of Information Act | Pay.gov (Fee Payments)

Local intranet 125%

Alaska ESP – extensive history...

- In place since 1973, completed over 400 studies, numerous syntheses
- Funded $320M+ on studies
- Maintains 50+ ongoing study projects
- In terms of scale and longevity, the Alaska ESP is most comprehensive Environmental Impact Assessment data collection effort in the world

Extensive Science Collaboration

- Federal
  - NOPP; NOAA-NMFS; USGS; FWS; BLM; NSF
- State of Alaska
  - University of Alaska (MMS Coastal Marine Institute); Department of Fish and Game
- Universities
  - CESUs (Pacific Northwest, North and West Alaska)
- Interagency Coordination Units (MMS on Boards)
  - North Slope Science Initiative; Alaska Ocean Observing System; USARC / Arctic Council
- Regional / Native Groups
  - NSB Dept. of Wildlife; AEWC / AWC; Tribal / Village
- Private contractors
- Industry
- MMS Coastal Impact Assistance Program
- MMS Technology Assessment & Research Program

Research is Mission Oriented

- Obtain Quality Information for Environmental Impact Assessment
  - Determine current baselines
  - Assess cumulative impacts from offshore activities
- Monitor Environmental Changes
  - Natural and Anthropogenic
  - Marine and Nearshore
  - Physical, Biological, Social
- Evaluate Potential Adaptations to the Program to Better Support the MMS Mission

Biogeochemical Assessment of the North Aleutian Basin Ecosystem: Current Status and Vulnerability to Climate Change

Biogeochemical Assessment of the North Aleutian Basin Ecosystem

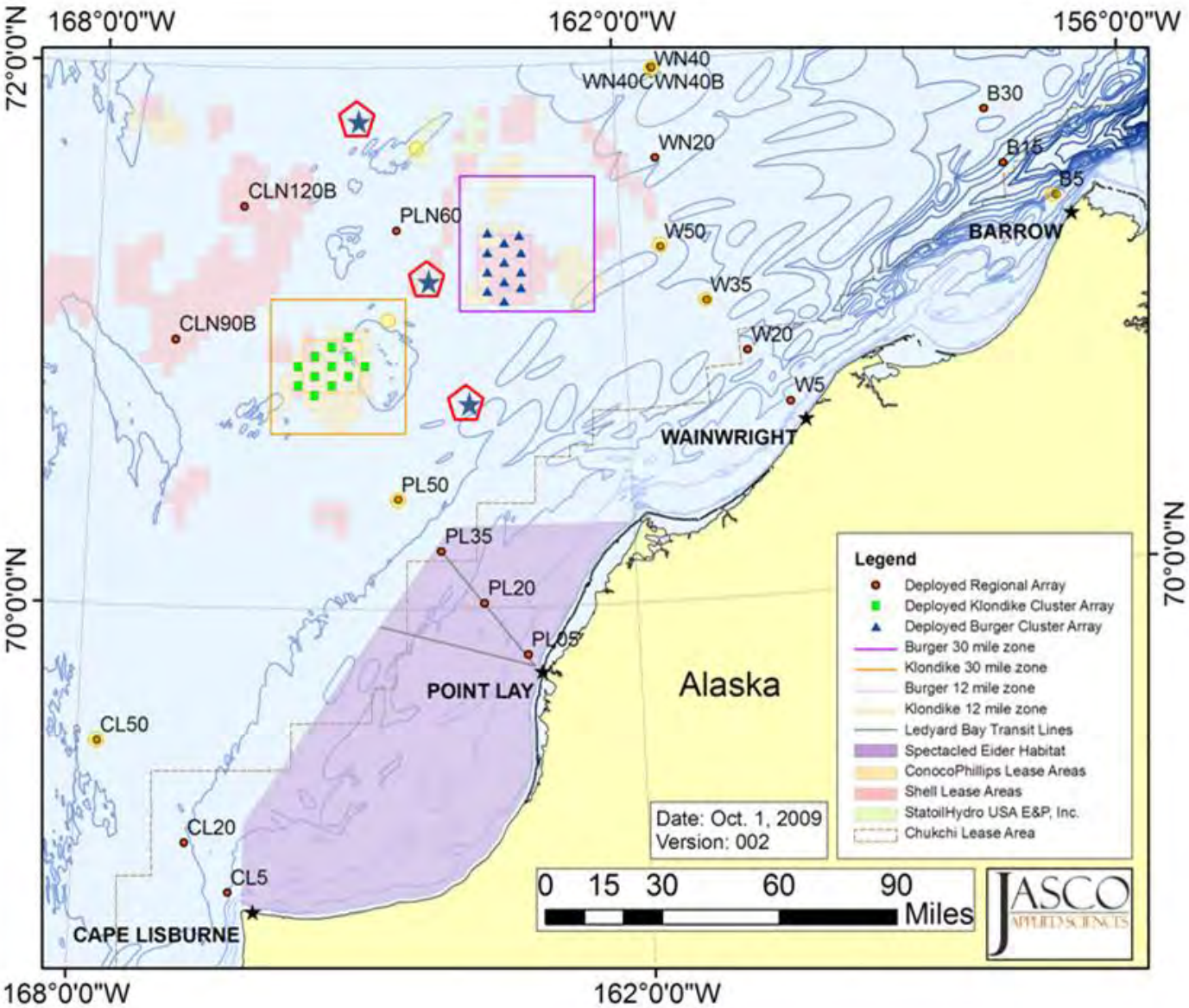
Mathis et al. 2010. Biogeosciences 7:251-300

Objectives include:

- Assessing the impact of climate variability on carbon biogeochemistry
- Determining the extent of ocean acidification in the Eastern Bering and Chukchi Seas and developing long-term projections for changes in pH

Chukchi Offshore Monitoring in Drilling Area (COMIDA): Factors Affecting the Distribution and Relative Abundance of Endangered Whales

- Passive Acoustic Detection and Monitoring of Endangered Whales in the Arctic
- Ecosystem Observations in the Chukchi Sea: Biophysical Moorings and Climate Modeling



Berchok et al., NOAA-NMML

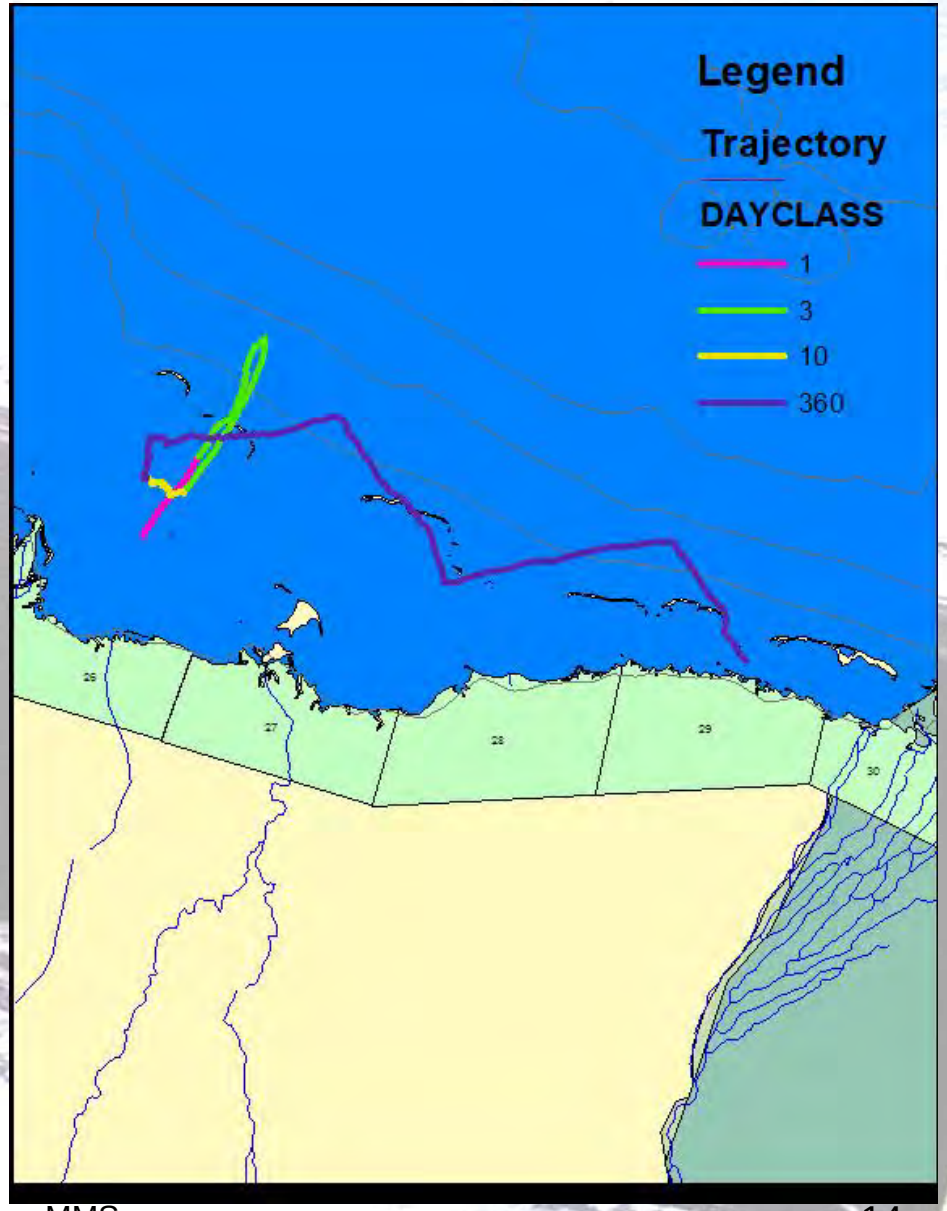
COMIDA: Factors Affecting the Distribution and Abundance of Endangered Whales

Objectives Include:

- Evaluating whether changes in seasonal sea ice extent is enabling a northward shift of Bering Sea cetacean species
- Evaluating the extent to which variability in environmental conditions such as sea ice, oceanic currents, water temperature and salinity, and prey abundance influence whale distribution and relative abundance
- Establishing predictive variables to describe large whale occurrence by comparing long-term estimates of habitat use by large whale species with predictions of annual ice coverage developed from climate model forecasts

Evaluation of the Use of Hindcast Model Data for Oil Spill Risk Assessment (OSRA) in a Period of Rapidly Changing Conditions

MMS Oil Spill Trajectory Analysis



Evaluation of the Use of Hindcast Model Data for OSRA

Objectives Include:

- Describing the effects of climate change on sea ice, circulation, river discharge, etc. in the Arctic Ocean and the impacts of these changes on surface circulation
- Describing the attributes of hindcast model data currently used for OSRA
- Evaluating alternate approaches such as the incorporation of forecast modeling results in the OSRA process to guide MMS in its study planning process

Many other studies consider the effects of climate change, such as loss of sea ice, or collect information that may be used to assess climate change.

Oceanography / Fates & Effects

- COMIDA Chemistry and Benthos
- Mapping and Characterization of Recurring Polynyas and Landfast Ice in the Chukchi Sea
- Beaufort/Chukchi Seas Mesoscale Meteorology Study Phase II

Biology

- Current and Historic Distribution and Ecology of Demersal Fishes in the Chukchi Sea Lease Area
- Population Connectivity and Larval Dispersal in Bering, Chukchi and Beaufort Sea Snow Crab Populations: Estimating Spatial Scales of Disturbance Impacts

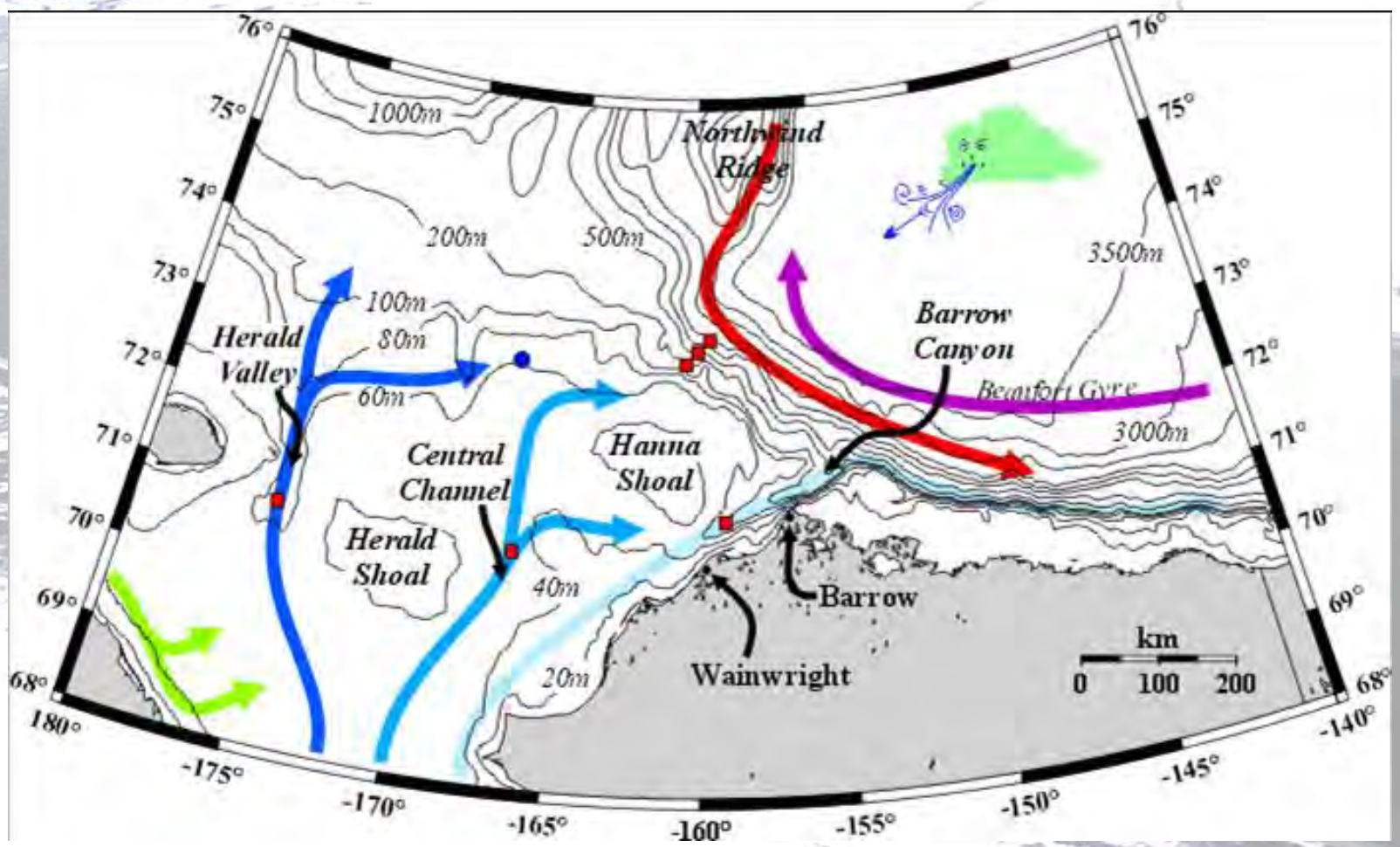
Protected Species

- Bowhead Feeding Variability in the Western Alaska Beaufort Sea
- Pinniped Movements and Foraging: Bearded Seals
- Pinniped Movements and Foraging: Walrus Habitat Use in the Potential Drilling Area (Chukchi)
- Demography of Polar Bears Summering on Shore in Alaska
- Population and Sources of Recruitment in Polar Bears
- Migration and Habitat Use by Threatened Spectacled Eiders in the Eastern Chukchi Near and Offshore Environment

Studies Proposed for FY 2011 and FY 2012

* This presentation does not constitute a commitment by MMS to conduct or fund any or all of these studies. The scope of the studies is subject to change prior to initiation of any work.

Hanna Shoal Ecosystem Study



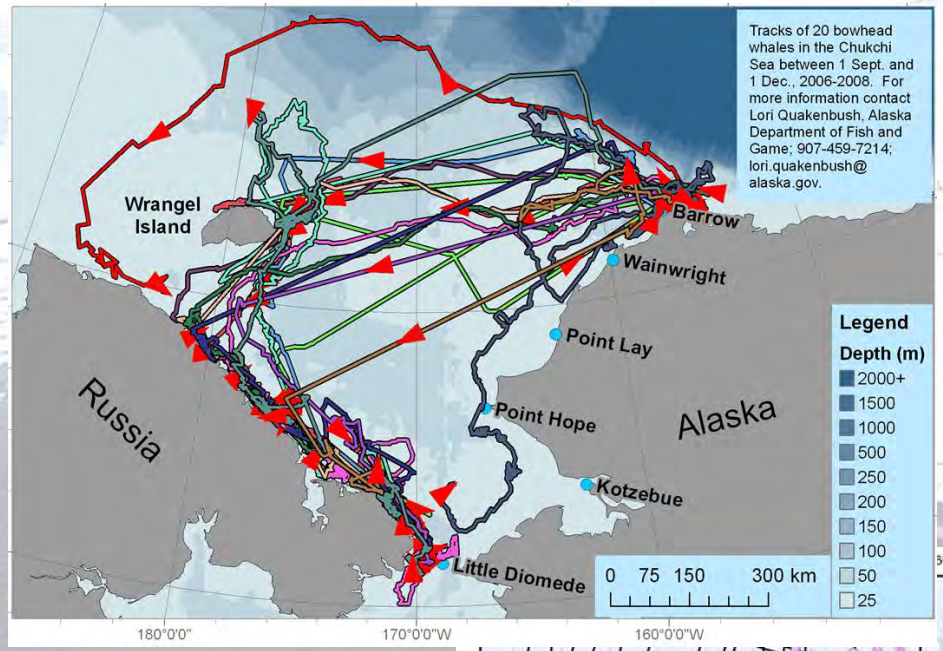
Weingartner, http://www.ims.uaf.edu/chukchi/

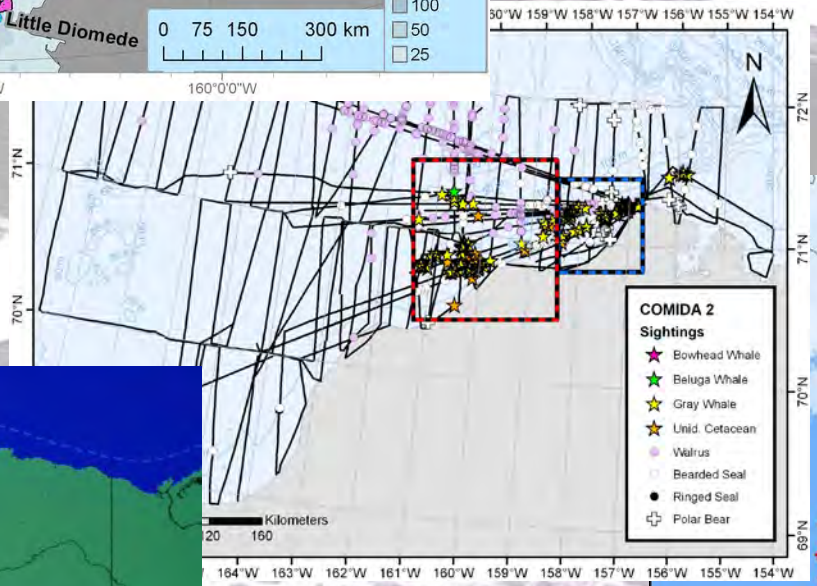
Hanna Shoal Ecosystem Study

Objectives include:

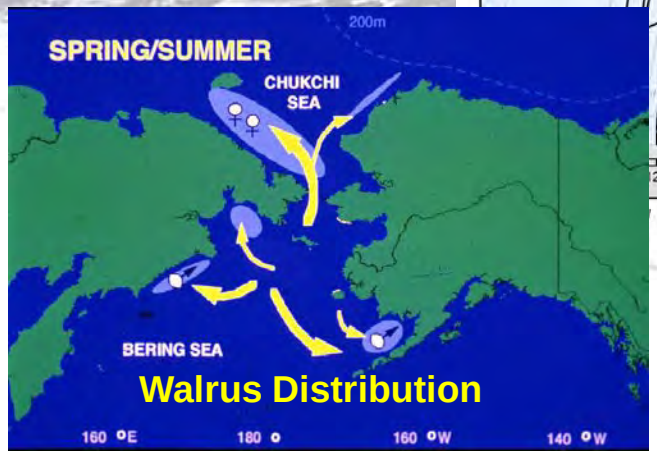
- Documenting circulation and density fields around Hanna Shoal
- Measuring and evaluating ecosystem productivity and biomass
- Enhance and expand the food web/contaminant bioaccumulation structure developed in the COMIDA CAB study

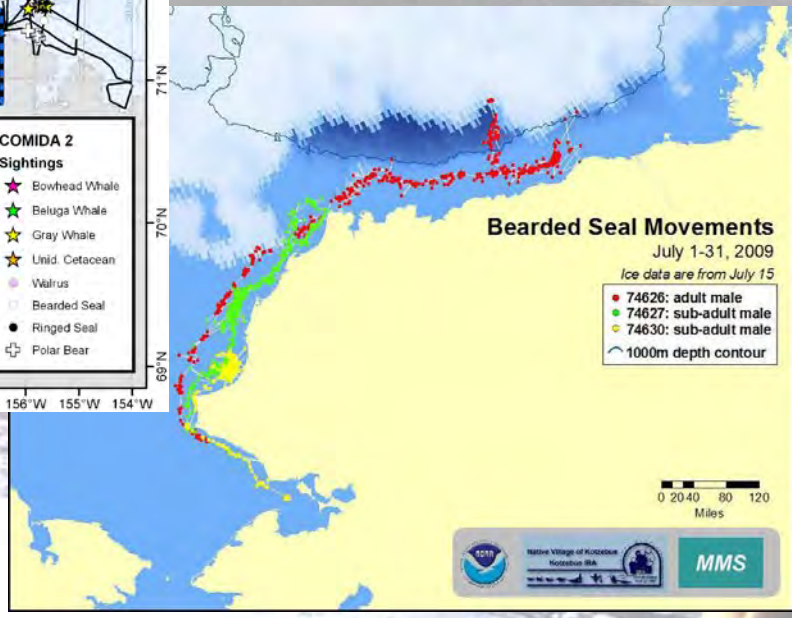
Marine Mammal / Physical Oceanography Synthesis





Natrional Marrine Mammal Lab, Seattle, WA





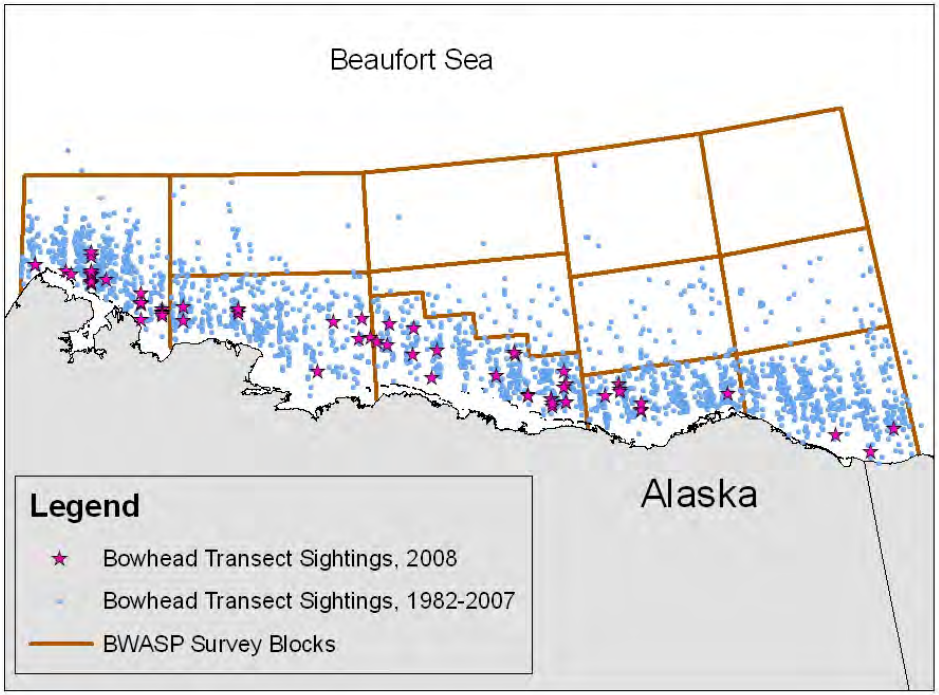
Marine Mammal / Physical Oceanography Synthesis

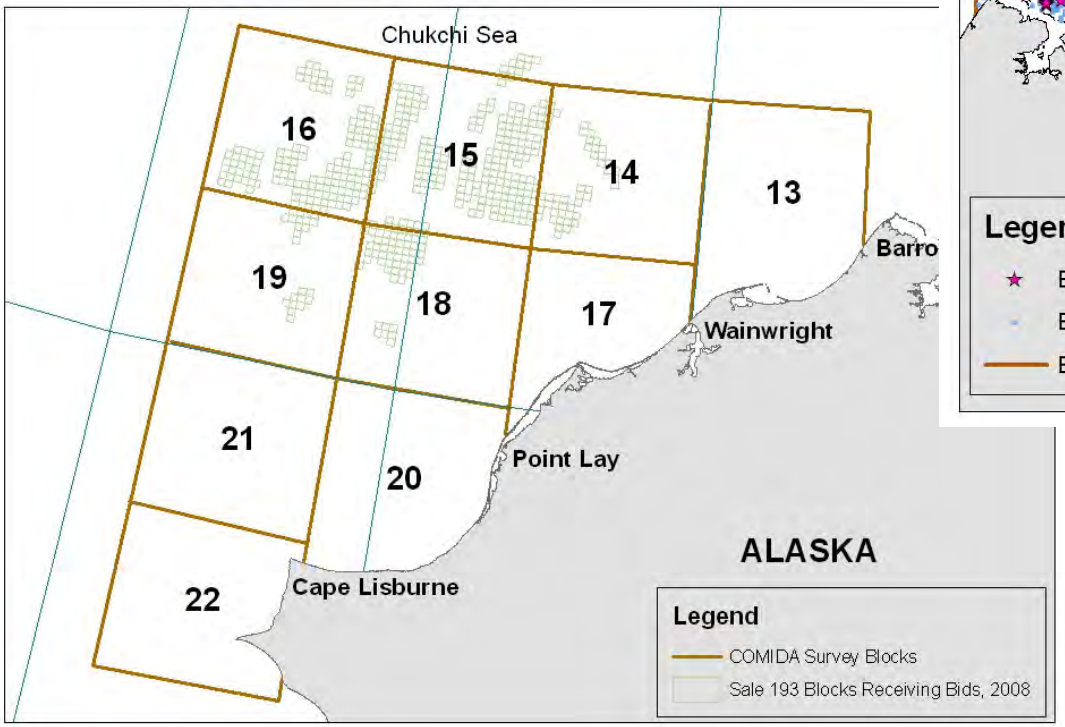
Objectives include:

- Increasing understanding among oceanographic conditions, lower trophic prey species and marine mammal distribution and behavior in the Chukchi
- Enhancing capability to predict future changes in these factors

Monitoring the Distribution of Arctic Whales (COMIDA/BWASP Extension)

BWASP Bowhead Whale Transect Sightings, 1982-2008





Natrional Marine Mammal Lab, Seattle, WA

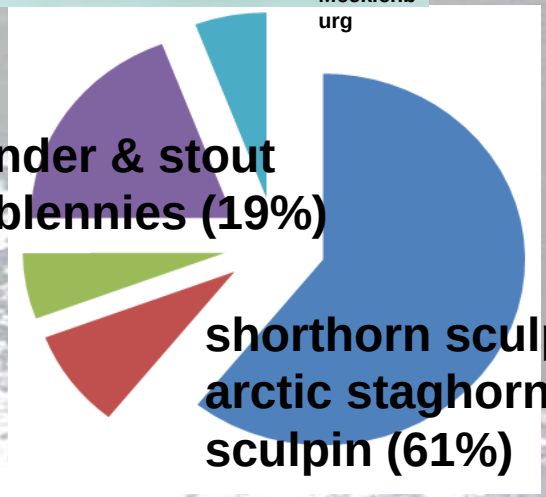
Monitoring the Distribution of Arctic Whales

Objectives include:

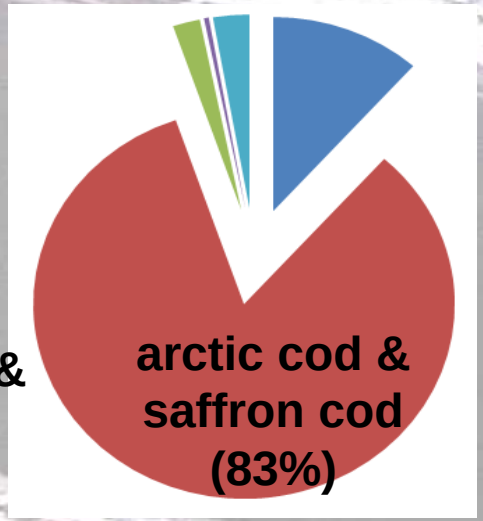
- Continuing long-term monitoring conducted by MMS since 1987 that is based on similar work dating to 1979
- Monitoring temporal and spatial trends in the distribution, relative abundance, habitat, and behaviors (especially feeding) of endangered whales in arctic waters

Distribution of Fish, Crab and Lower Trophic Communities in the Chukchi Sea Lease Area

2004 (Norcross et al. 2009)



1990 (Barber et al. 1997)



Demersal fish composition

sculpin cod flatfish prickleback other

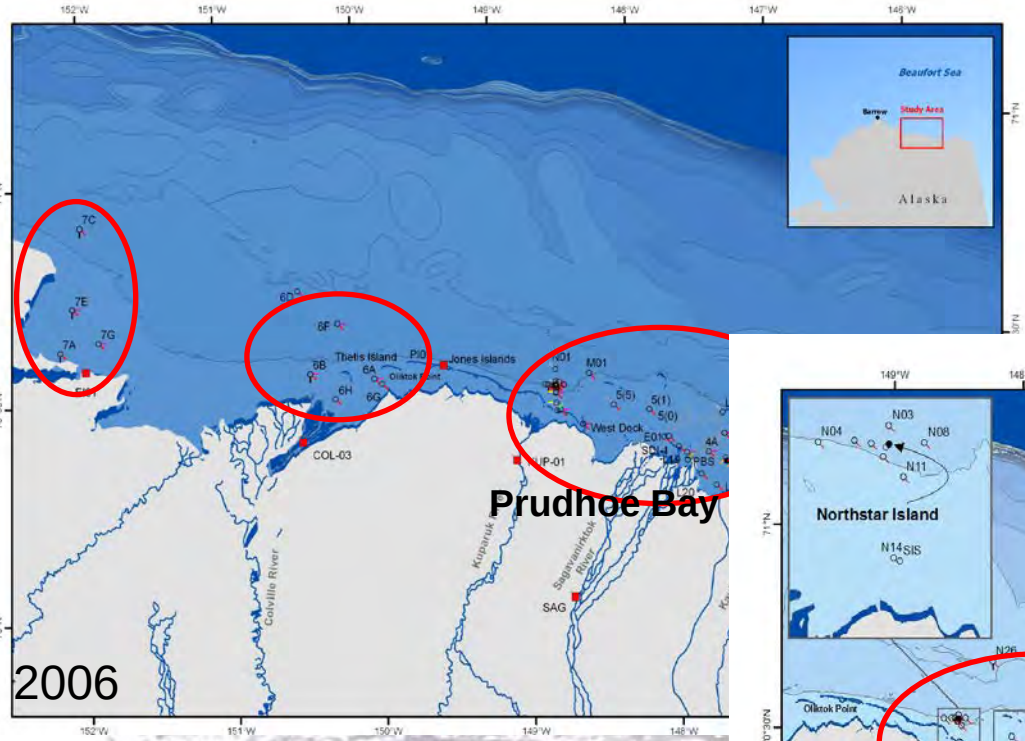
Norcross and Holloday, 2010 Alaska Marine Science Symposium

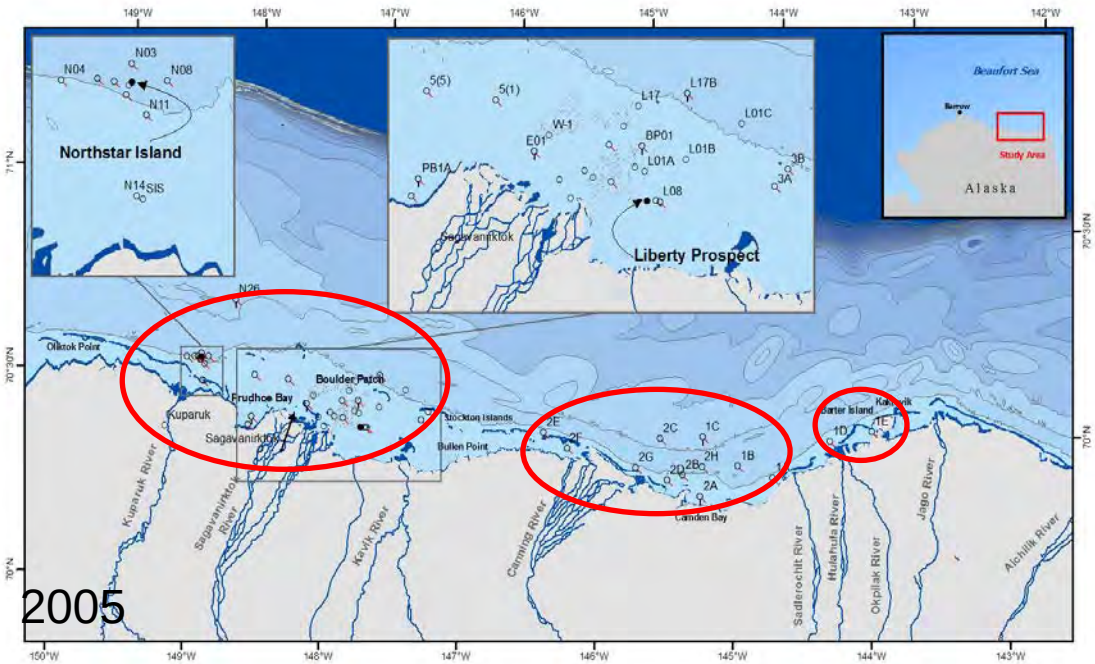
Distribution of Fish, Crab and Lower Trophic Communities in the Chukchi Sea Lease Area

Objectives include:

- Documenting the distribution of pelagic and demersal fish and invertebrate communities in the Chukchi Sea lease area
- Providing a comparison of these communities with that of prior studies, as well as adjacent regions (Beaufort and Bering Seas)

ANIMIDA III: Contaminants, Sources, Bioaccumulation





G. Durell: http://www.duxbury.battelle.org/CANIMIDA/home/index.cfm

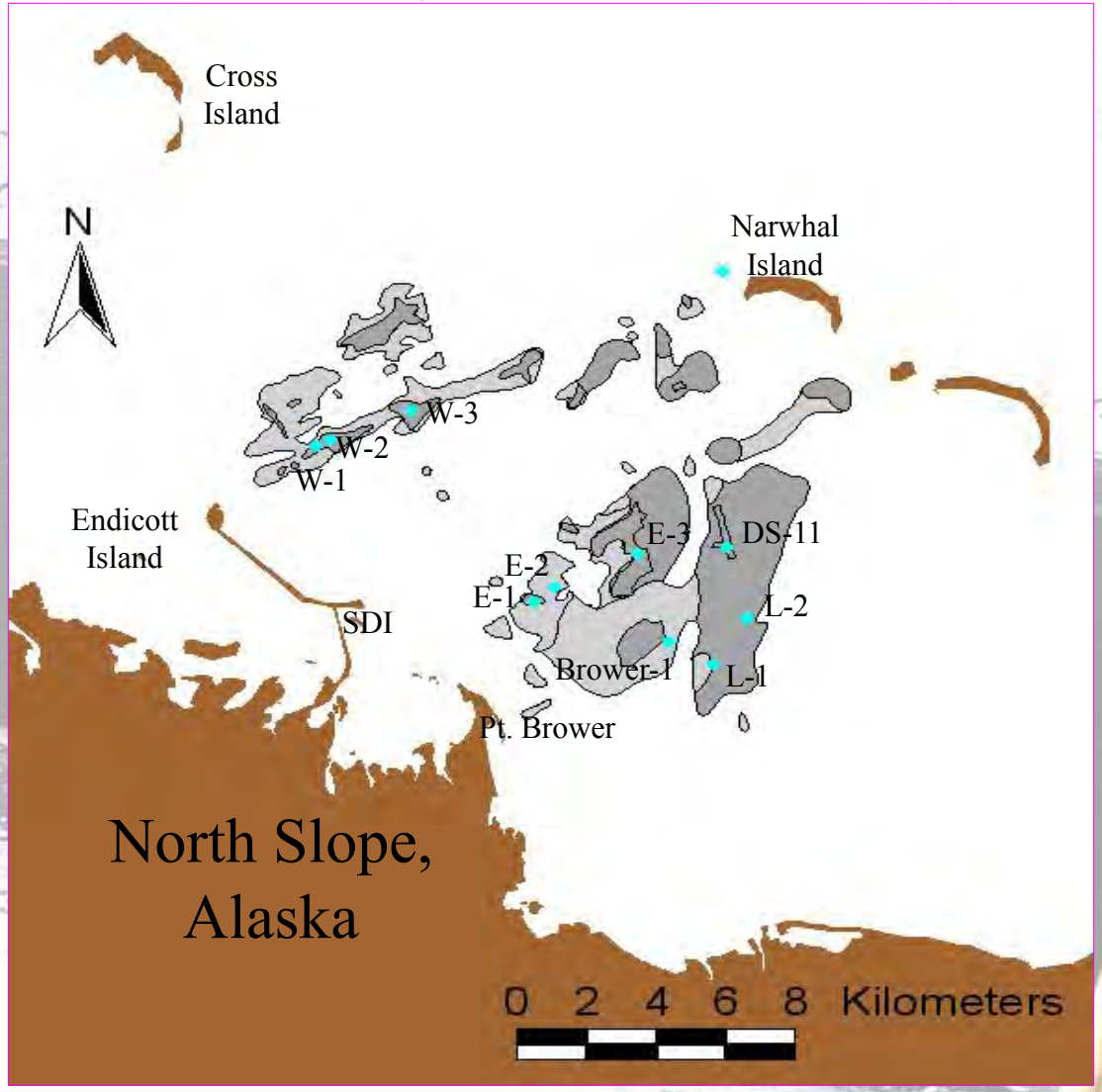
Stefansson Sound Boulder Patch

= >25% boulder cover

= Between 10-25% boulder cover

= Historical and cANIMIDA permanent sampling sites

Boulder cover based on Geologic survey conducted In 1999 (Ban *et al.*)



G. Durell: http://www.duxbury.battelle.org/CANIMIDA/home/index.cfm

ANIMIDA III: Contaminants, Sources, Bioaccumulation

Objectives include:

- Continuing the Arctic Nearshore Impact Monitoring in Development Area (ANIMIDA) and continuation of ANIMIDA (cANIMIDA) started in 1999 to monitor chemical contamination, turbidity and Boulder Patch productivity in the vicinity of oil industry development in the Beaufort Sea OCS
- Improving ANIMIDA/cANIMIDA conceptual models of suspended sediment behavior and bioaccumulation

Cape Lisburne Seabird Colony Productivity and Foraging Areas (FY 2012)

USFWS Lisa Sheffield

USFWS Max Kauffman

Cape Lisburne Seabird Colony Productivity and Foraging Areas (FY 2012)

Objectives include:

- Estimating productivity of Common and Thick-billed Murres and Black-legged Kittiwakes at the Cape Lisburne colony to establish a current baseline
- Comparing the data to results of older surveys

Topical Areas for Future Studies Related to Climate Change

- Changes to both physical oceanography and ecosystem productivity caused by loss of sea ice cover
- Ramifications of loss of sea ice for marine mammals, bird and fish species that live on, below, or near the ice
- Effects on ocean circulation due to changes in climatological factors such as winds and river runoff and sea ice coverage

Topical Areas for Future Studies Related to Climate Change

- Socio-economic issues including:
  - increased shoreline erosion and permafrost melt that threatens arctic villages and infrastructure
  - changes in distribution and availability of hunted subsistence species
  - potential changes in commercial and subsistence fisheries as commercial species such as salmon move north

The Alaska OCS Region Environmental Studies Plan

- The Alaska Annual Studies Plan is published each year in late summer and includes a letter to stakeholders soliciting suggestions for new studies for the following year.
- It is posted on our webpage: http://www.mms.gov/alaska/ess/index.htm
- Send email to Heather.Crowley@mms.gov to be placed on the mailing list

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* Notices posted within the last 90 days

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Vendors and citizens may search, monitor, and retrieve opportunities.

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RECOVERY

FBO now contains Recovery and Reinvestment Act actions.

SEARCH RECOVERY OPPORTUNITIES

SEARCH RECOVERY AWARDS

FBO RECOVERY REPORTS

- Click here for Opportunities
- Click here for Awards

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Use Adobe Acrobat Reader to view files in PDF format.

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Watch demonstration videos designed to familiarize you with the features and functionality of the

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Ocean Conditions, Salmon, and Climate Change

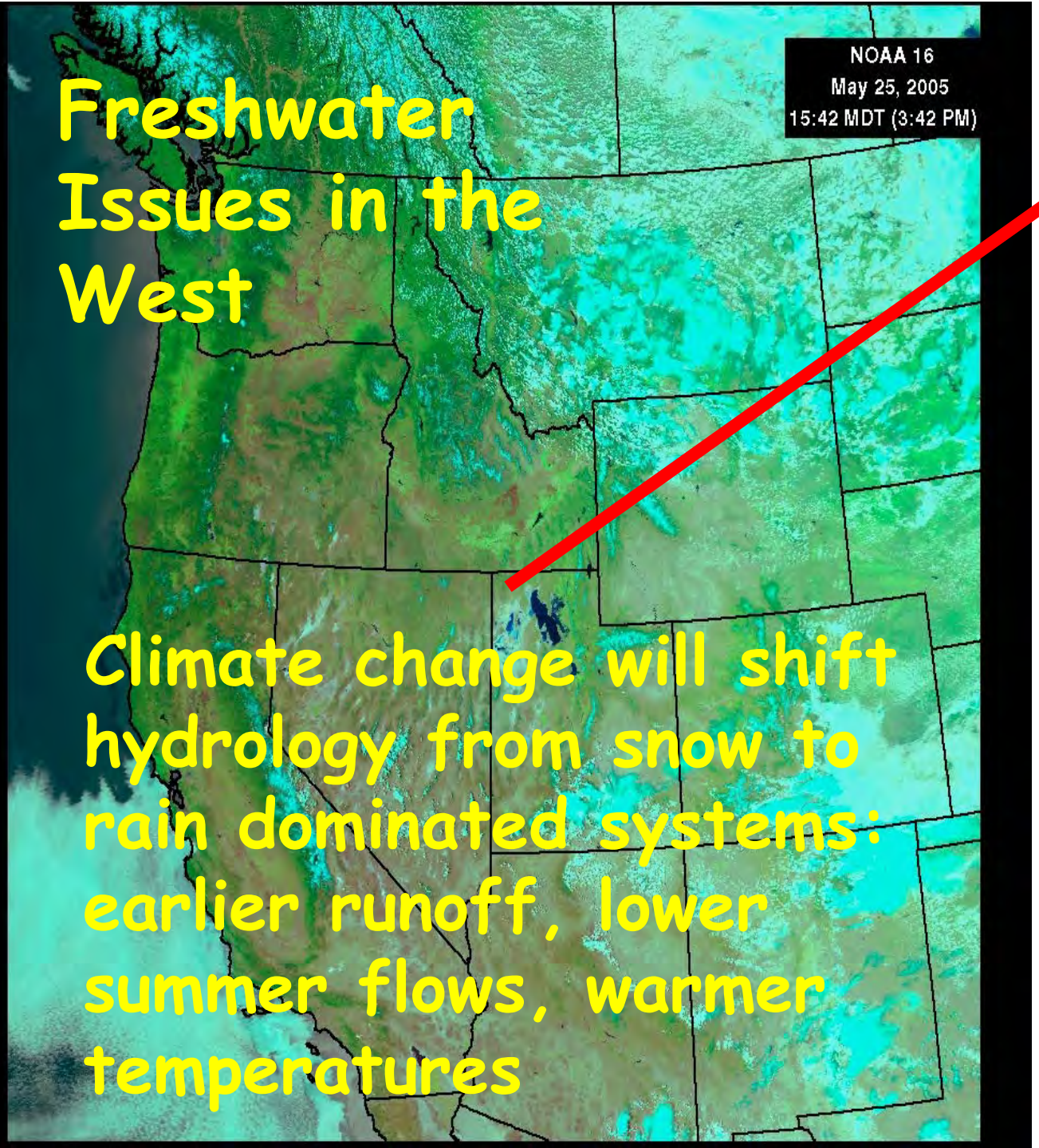
John Ferguson
NOAA Fisheries
Northwest Fisheries Science Center
Seattle, Washington

CESU -- April 29, 2010

Topics

- Effects of climate change in freshwater on salmon
- Effects of climate change in the ocean on salmon
- Life-cycle modeling (tying it all together)
- Ocean acidification
- Recommendations……

Freshwater Issues in the West



Climate change will shift hydrology from snow to rain dominated systems: earlier runoff, lower summer flows, warmer temperatures

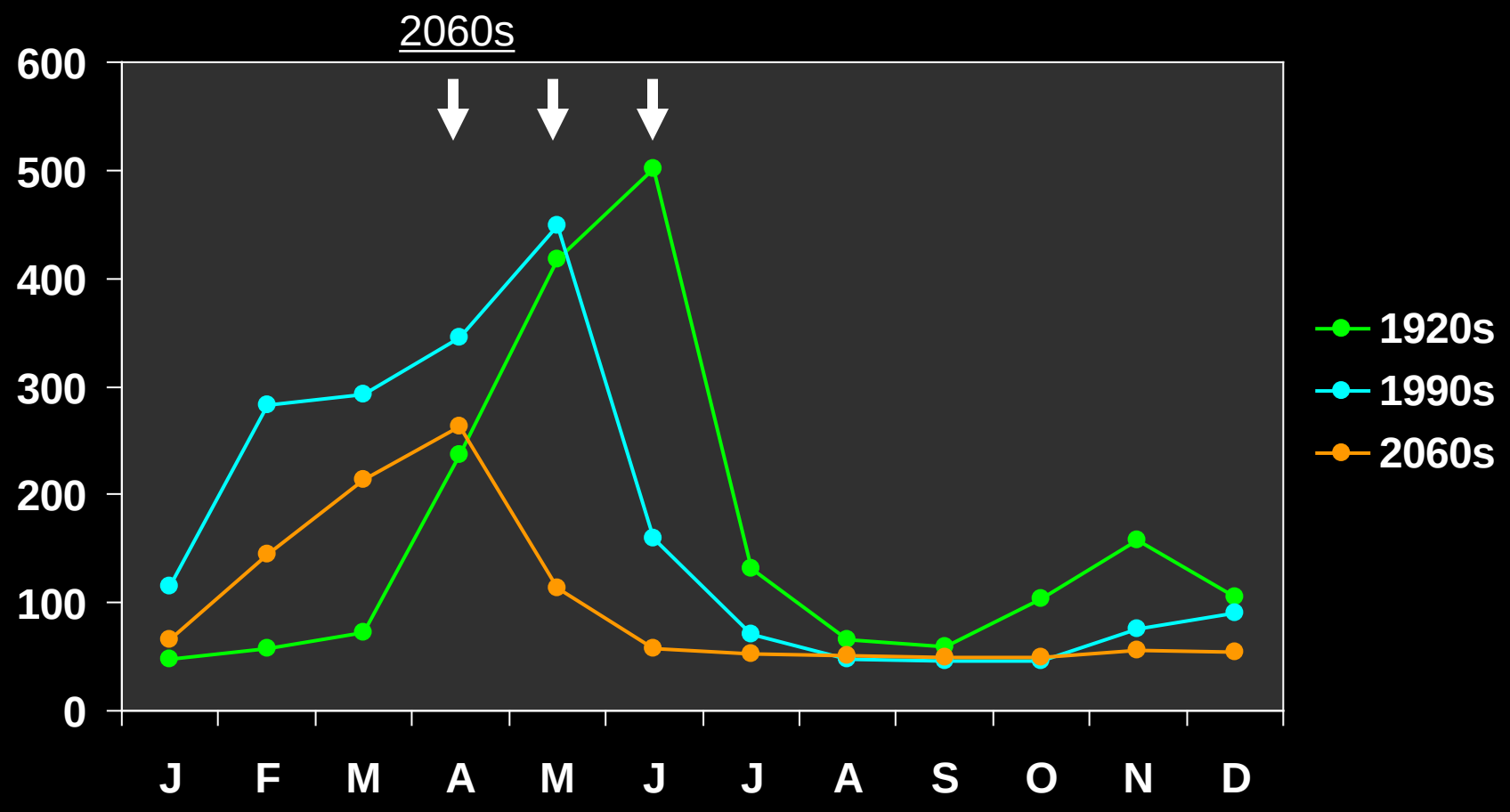
Today: > 30 salmon stocks listed under ESA

Future:

1. Human population growth

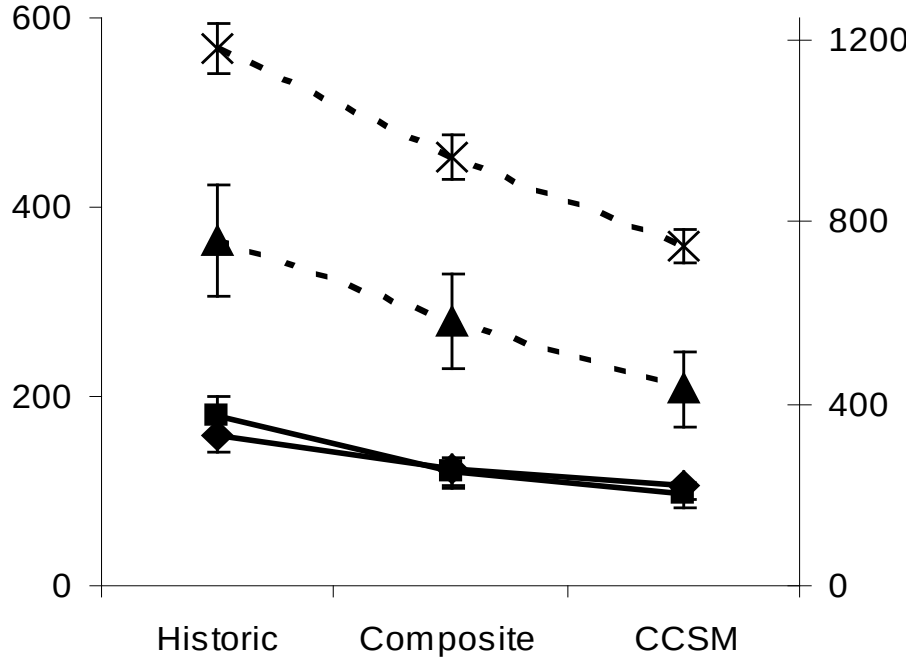
2. Increased demand for water, power resources

Runoff regimes are shifting: Spring runoff will be less and earlier



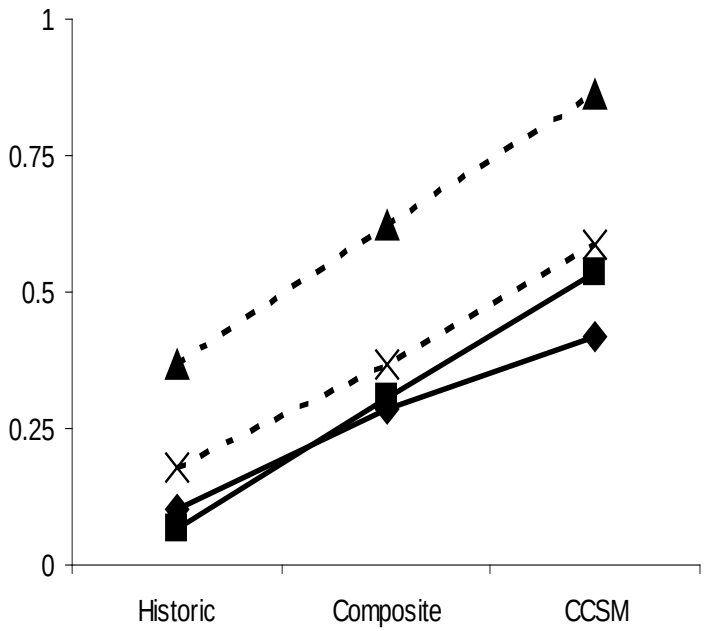
Effects of future (IPCC) climate scenarios: Salmon River Idaho

1. Salmon abundance decreases:



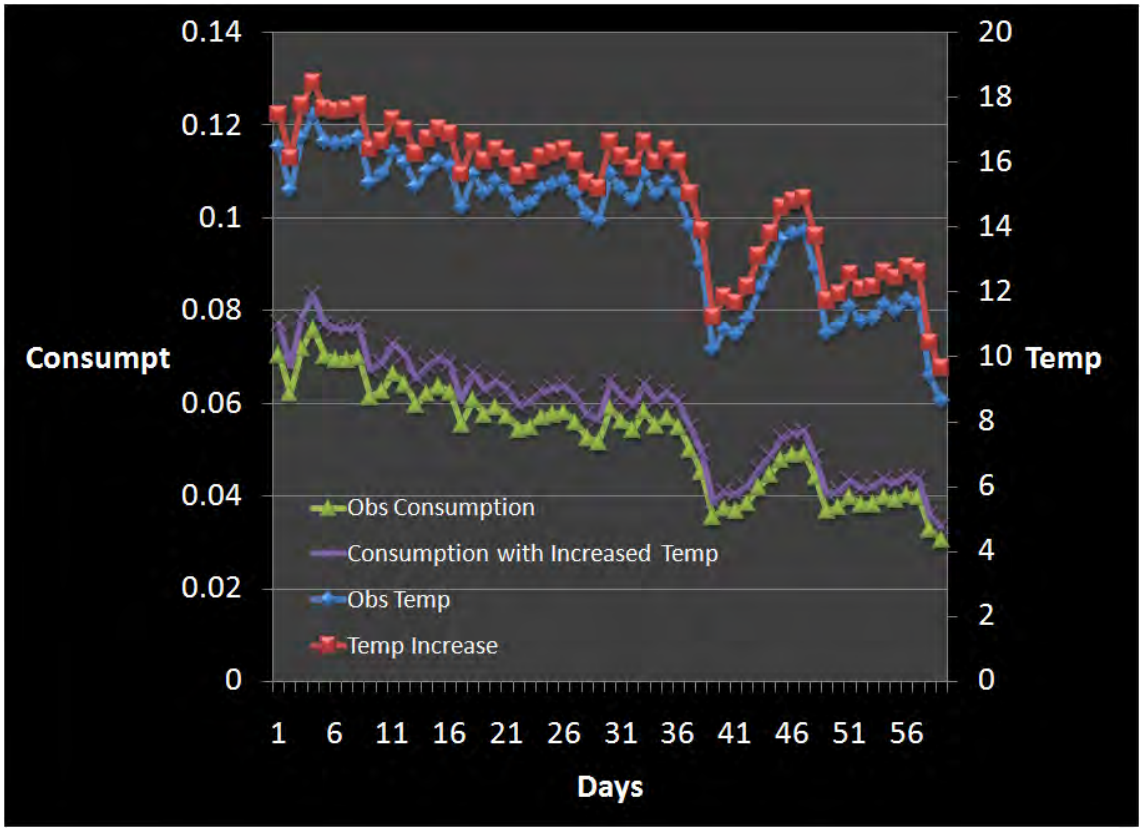
Climate scenarios

2. Extinction risk increases:



Climate scenarios

Responses are not linear - how will increasing temperatures affect fish consumption?



With a 1 degree C increase in air temperature, juvenile Chinook salmon consumption rates increase by 9%. With climate change, Chinook feeding will need to increase in an already food limited system.

Chittaro, P., K. Haught, B. Sanderson and R. Zabel

Restoring salmon in a changing climate

Tim Beechie
NW Science Center
Seattle, Washington

Key management questions

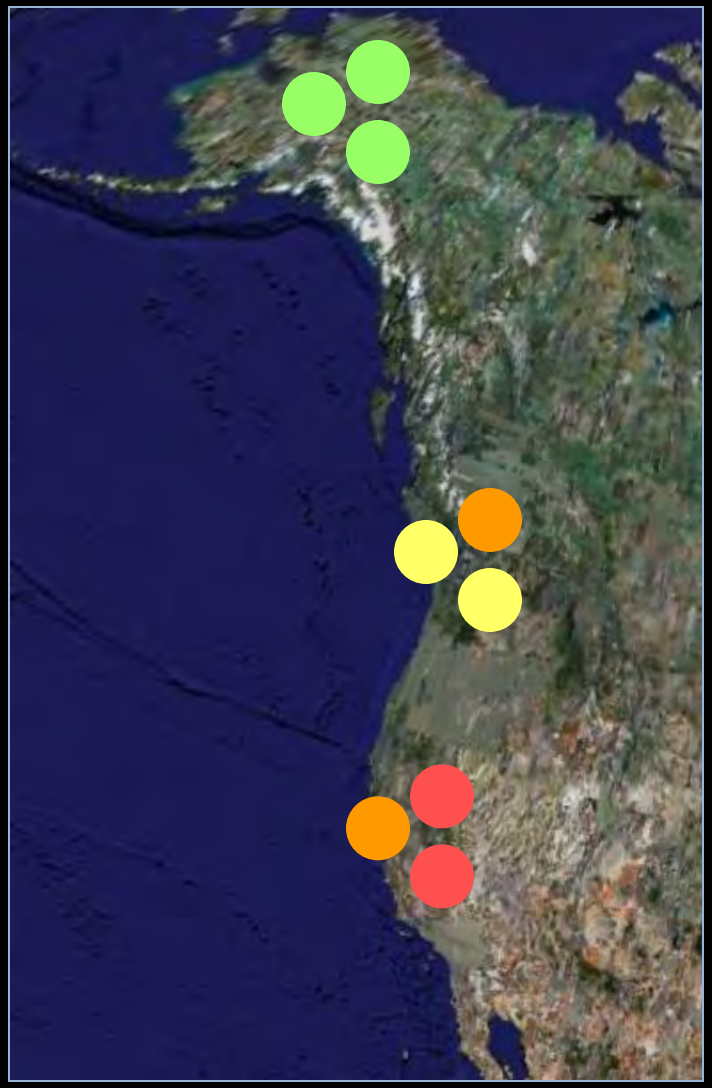
- Where should we invest in salmon protection across their range?
- Do climate change predictions alter restoration plans?
- What restoration strategies can increase salmon resilience to climate change?

So which populations are sensitive?

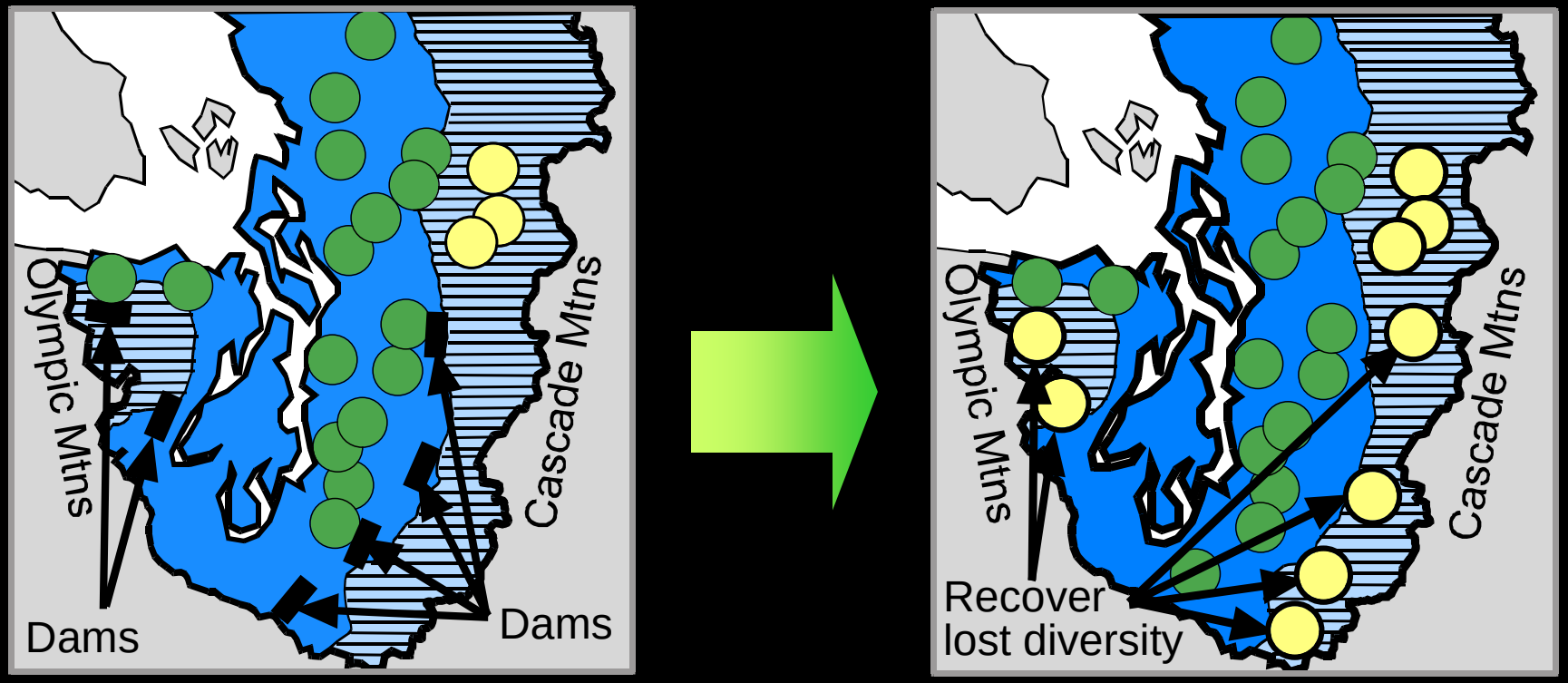
North: mostly better

PNW: some better,
some worse

South: mostly worse



Restore access to diverse habitats



Rainfall/transitional hydrologic regime

Snowmelt hydrologic regime

Ocean-type Chinook population

Stream-type Chinook population

Waples et al. 2008

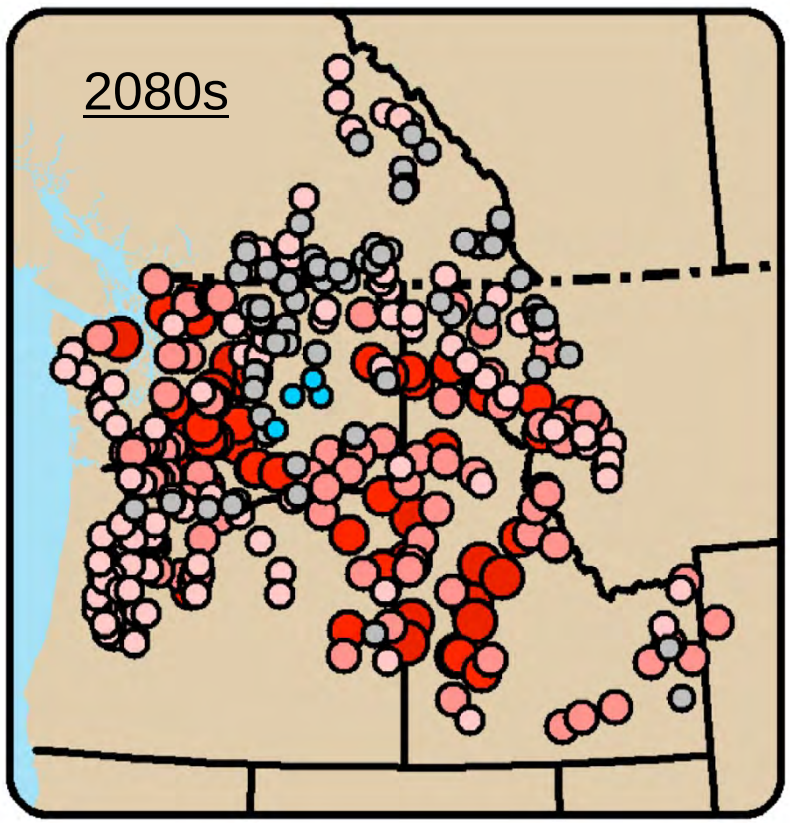
Do climate change predictions alter restoration plans?

What will climate change do here?

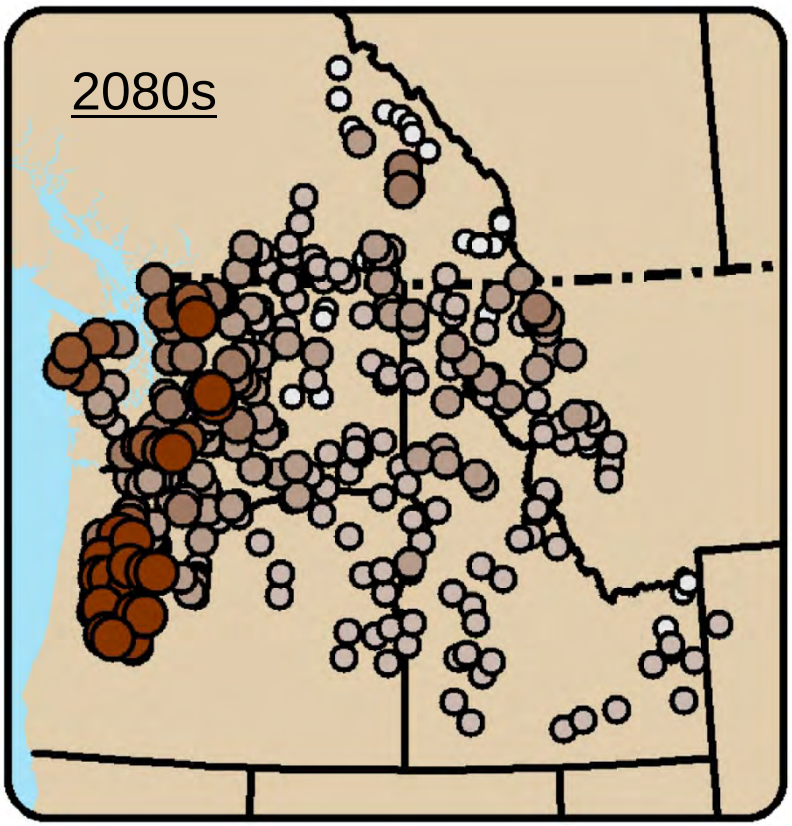
How will restoration actions respond to those changes?

Predicted change in extreme flows

20-year flood



10-yr, 7-day low flow



>50% increase in flow

<50% of current flow

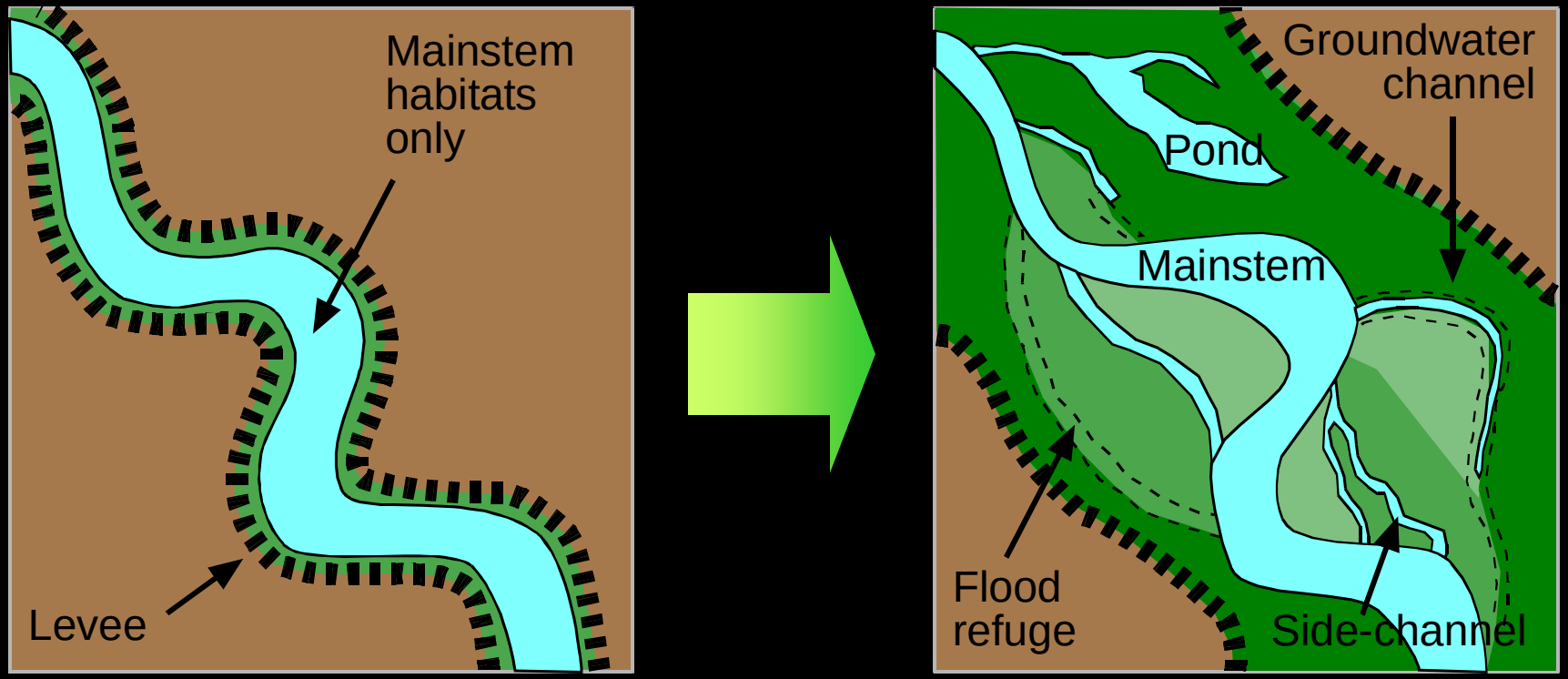
Tohver and Hamlet 2010

Restoration techniques and climate change

Restoration technique	Does technique ameliorate climate change effect?		
	Temperature increase	Low flow decrease	Peak flow increase
Road rehabilitation	N	N	N/Y
Riparian rehabilitation	Y	N/Y	N
Floodplain connectivity	Y	N	Y
Restore in-stream flow	Y	Y	N
In-stream habitat	N	N	N
Nutrient enrichment	N	N	N
Restore incised channel	Y	Y	Y

Summary table by Jen Greene

Increase habitat diversity



Waples et al. 2008

Restore incised channels

- Increased aquifer storage
- Increased stream flow
- Increased riparian function

Summary

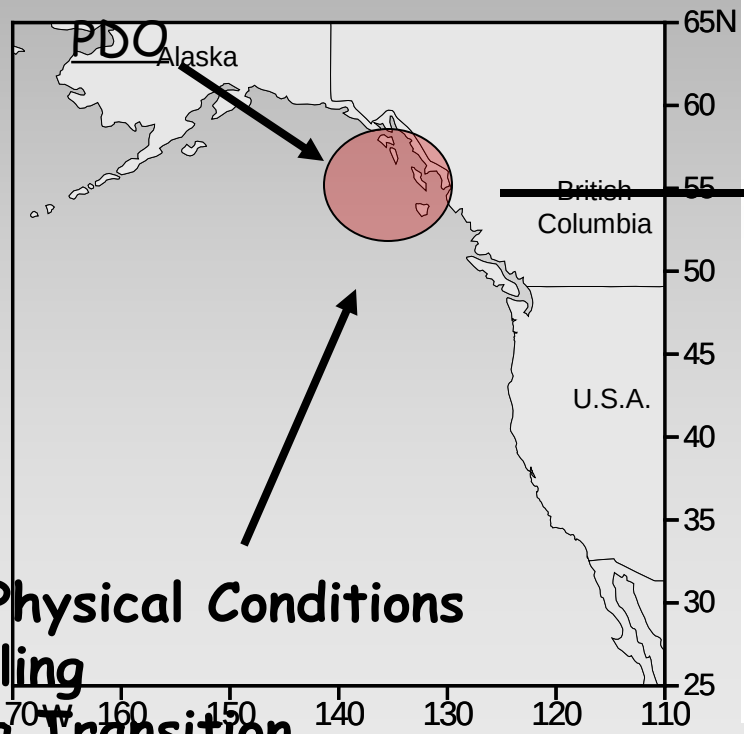
- Salmon vulnerability to climate change
  - Most severe in the south, getting better northward
- Does climate change alter restoration plans?
  - Depends on where you are
  - Depends on what you're trying to do
- Restoration strategies to increase resilience
  - Increase habitat diversity
  - Restore flow regimes

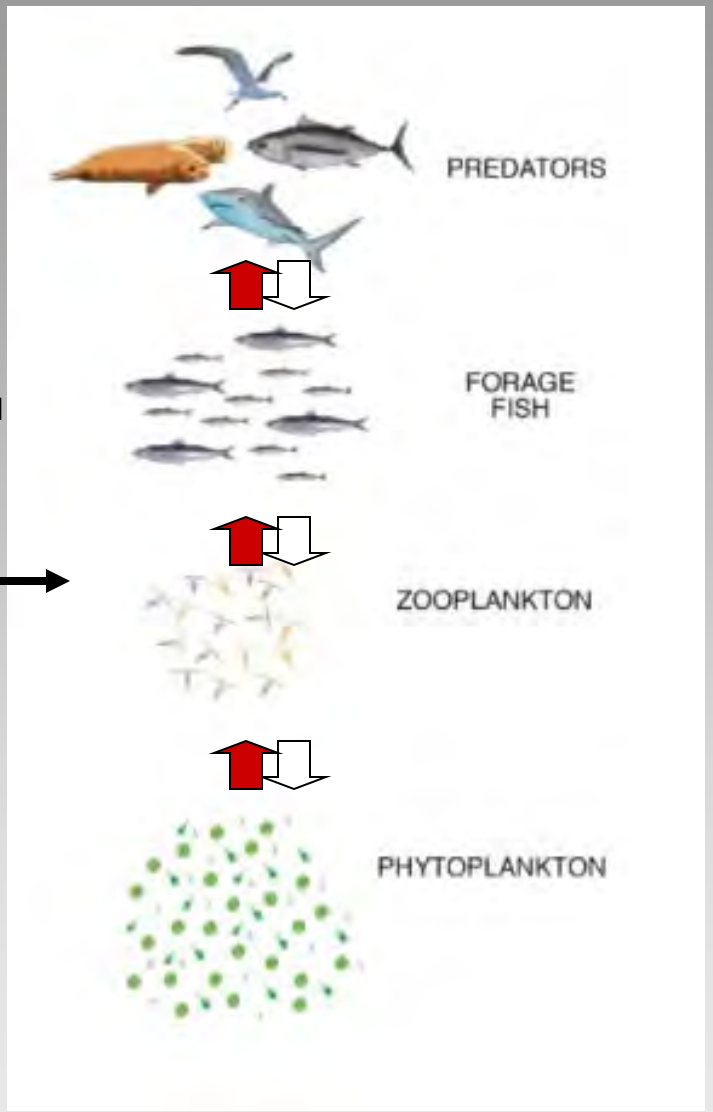
2. Ocean productivity sets salmon recruitment into adult life stages

- Return rates can vary >10x with similar freshwater conditions/survival
- Trends displayed at multiple scales:
  - Annual
  - Decadal
  - 60-100 years
  - Millennia

We have developed a suite of physical and biological indices to predict ecosystem response to climate variability

Large scale forces acting at the local scale influence biological process important for salmon





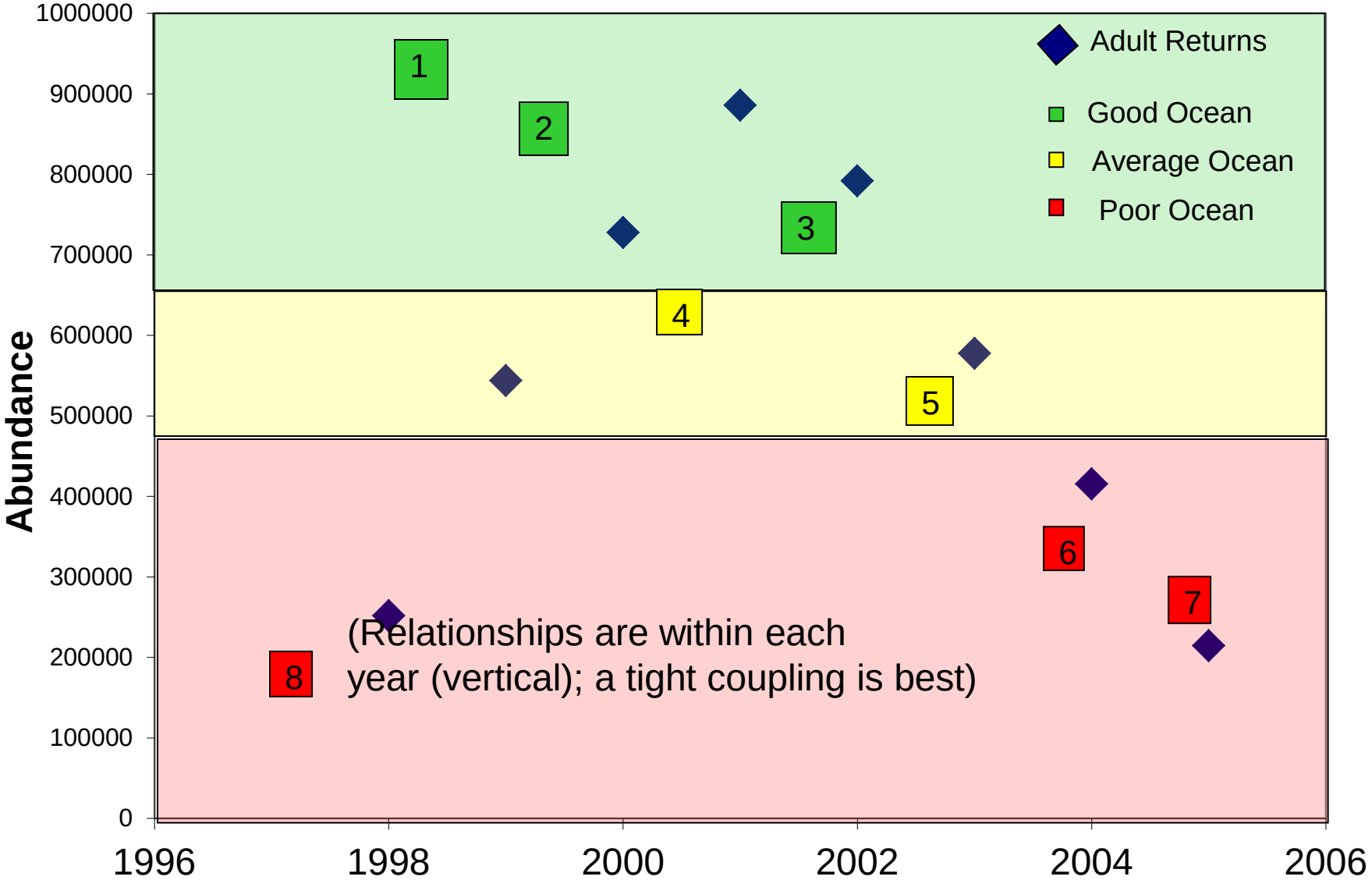
Local Physical Conditions
- Upwelling
- Spring Transition
- Temperature

Local Biological Conditions

Environmental Variables	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
PDO (December-March)	11	4	2	8	5	12	7	10	9	6	3	1
PDO (May-September)	9	2	3	4	6	11	10	12	8	7	1	5
MEI Annual	12	1	3	5	11	10	8	9	6	4	2	7
MEI Jan-June	12	2	3	5	8	10	7	11	4	9	1	6
SST at 46050 (May-Sept)	10	8	3	4	1	6	12	9	5	11	2	7
SST at NH 05 (May-Sept)	8	2	1	4	6	7	12	11	5	9	3	10
SST winter before going to sea	12	7	5	6	4	8	11	10	9	3	1	2
Physical Spring Trans (Logerwell)	8	7	2	1	4	10	9	12	10	3	6	5
Upwelling (Apr-May)	7	1	11	3	6	10	9	12	7	2	4	5
Deep Temperature at NH 05	12	5	6	3	1	8	9	10	11	4	2	7
Deep Salinity at NH05	12	5	6	4	3	10	11	8	7	1	2	9
Length of upwelling season	7	3	2	10	1	11	9	12	6	5	8	4
Copepod richness	12	2	1	5	3	9	8	11	10	6	4	7
N.Copepod Anomaly	12	9	3	6	2	10	7	11	8	5	1	4
Biological Transition	11	5	4	7	6	10	8	12	9	2	1	3
Copepod Community structure	12	3	4	6	1	8	9	11	10	7	2	5
Catches of salmon in surveys												
June-Chinook Catches	11	2	3	9	6	8	10	12	7	5	1	4
Sept-Coho Catches	9	2	1	4	3	5	10	11	7	8	6	12
Mean of Ranks of Environmental Da	10.4	3.9	3.5	5.2	4.3	9.1	9.2	10.8	7.7	5.4	2.8	5.7
RANK of the mean rank	11	3	2	5	4	9	10	12	8	6	1	7

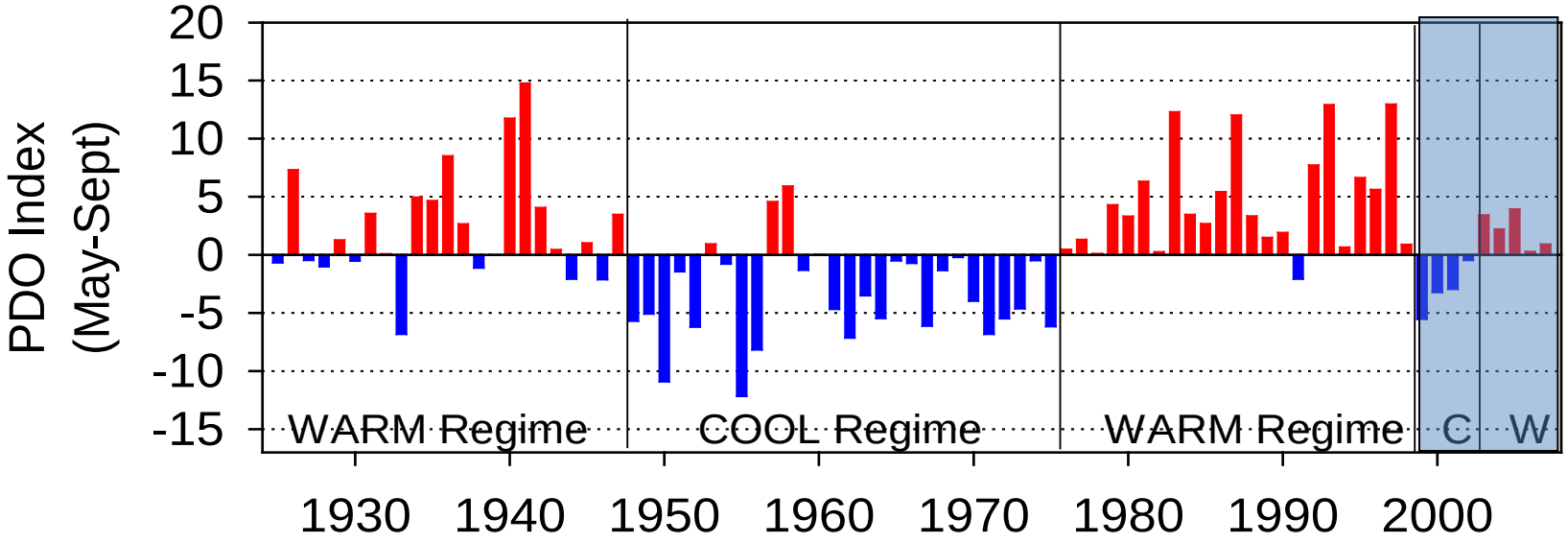
"Stop-light" figure summarizing ocean indicators over the past 12 years.
Based on rank order we predict adult salmon returns 1-2 years into future.

Returns of Columbia River fall Chinook vs. rank order of ocean conditions



Variability may be increasing?

(PDO: May-Sep Average, 1925-2007)

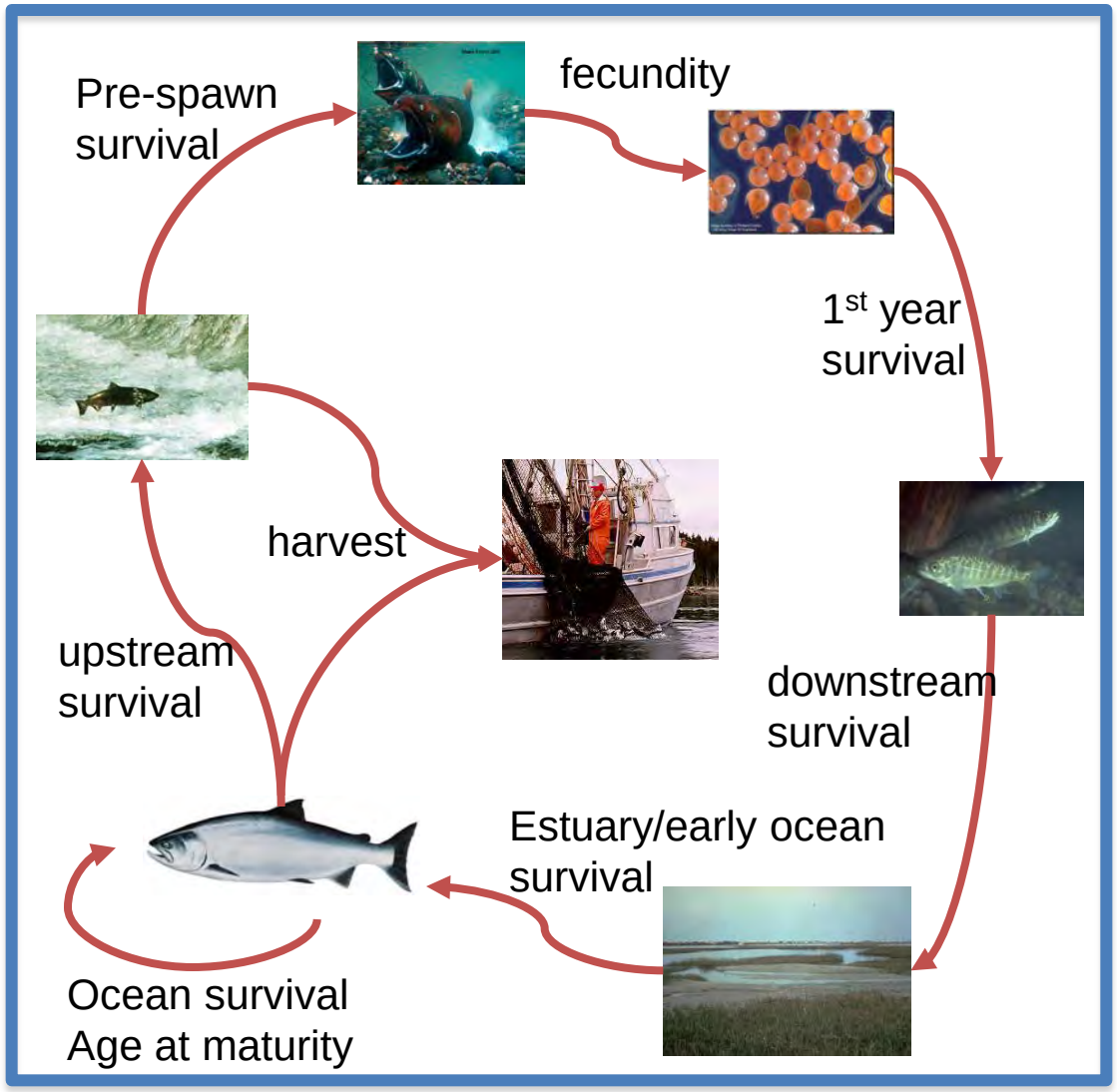


- We have had two shifts of four years duration recently: 1999-2002 and 2003-2006.
- Is this the future?

How do we use this information?

- View FW actions in context of marine ecosystem variability & integrate with marine productivity:
  - Adjust flow, hatchery release timing to match marine productivity
  - Scale hatchery production to marine productivity
- Increase salmon population diversity and complexity to buffer effects of climate change (including estuary habitat)

3. NWC's Stochastic Life-Cycle Model

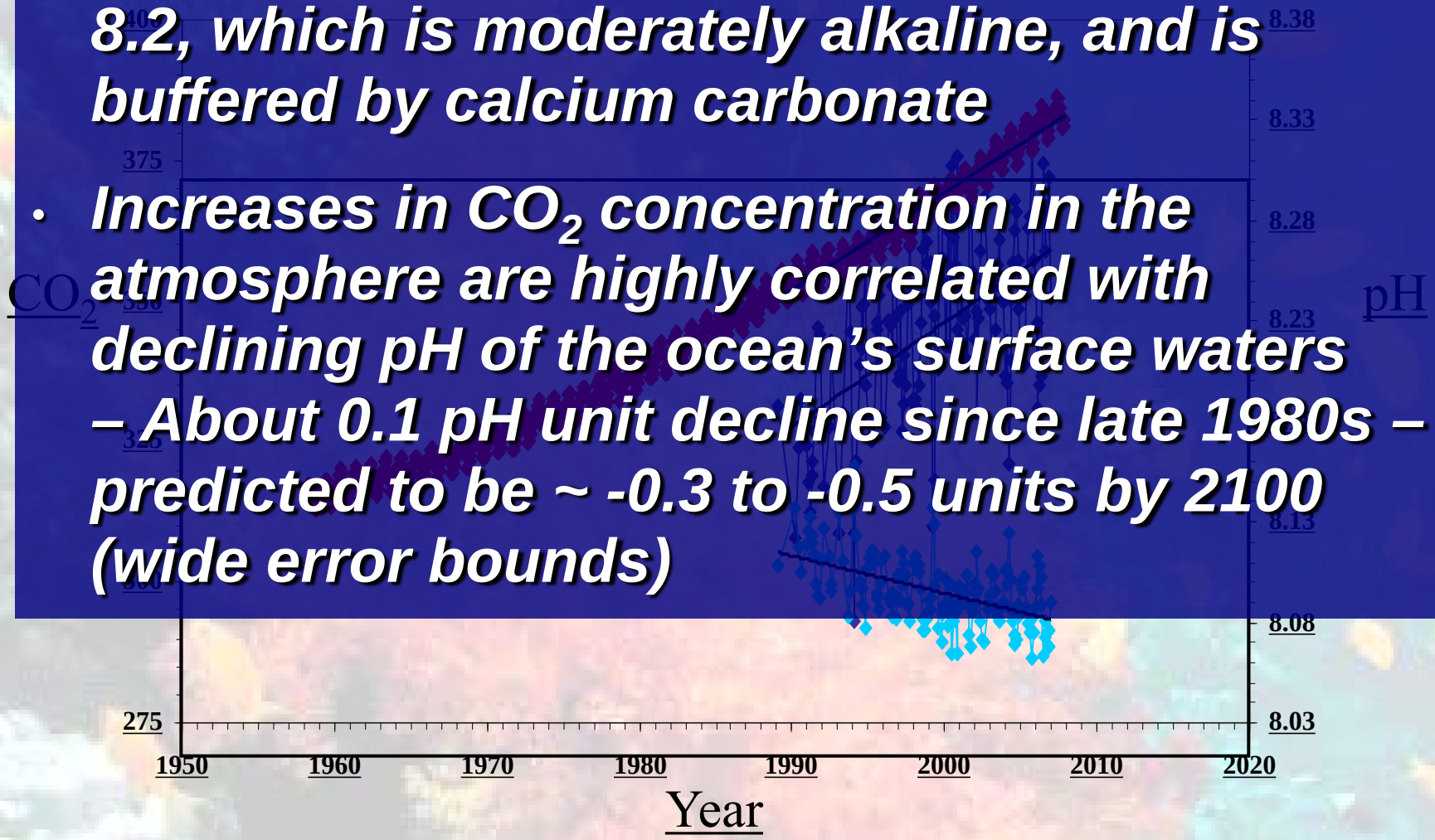


Future directions under the FCRPS BiOp Adaptive Management Implementation Plan (AMIP):

- Additional populations
- Enhanced climate modeling
- Spatial connectivity and correlation among populations
- Dam breaching scenarios
- Hatchery impacts
- Near-term population forecasts
- Inter-specific interactions
- Effects of habitat actions
- Life history diversity

4. Ocean Acidification: Global Warming's *Evil Twin*

- ***Average pH of the world's oceans is about 8.2, which is moderately alkaline, and is buffered by calcium carbonate***
- ***Increases in CO_2 concentration in the atmosphere are highly correlated with declining pH of the ocean's surface waters – About 0.1 pH unit decline since late 1980s – predicted to be ~ -0.3 to -0.5 units by 2100 (wide error bounds)***



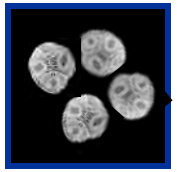
Adapted from Feely 2009

Concern for Many Marine Organisms and Ecosystems

- Reduced calcification rates
- Significant shift in key nutrient and trace element speciation
- Shift in phytoplankton diversity
- Reduced growth, production and life span of adults, juveniles & larvae
- Reduced tolerance to other environmental fluctuations
- Changes to fitness and survival
- Changes to species biogeography
- Changes to key biogeochemical cycles
- Changes to food webs
- Changes to ecosystem & their services
- Uncertainities great – research required

Feely 2009

Potential Effects on Open Ocean Food Webs



Coccolithophores

ARCOD@ims.uaf.edu

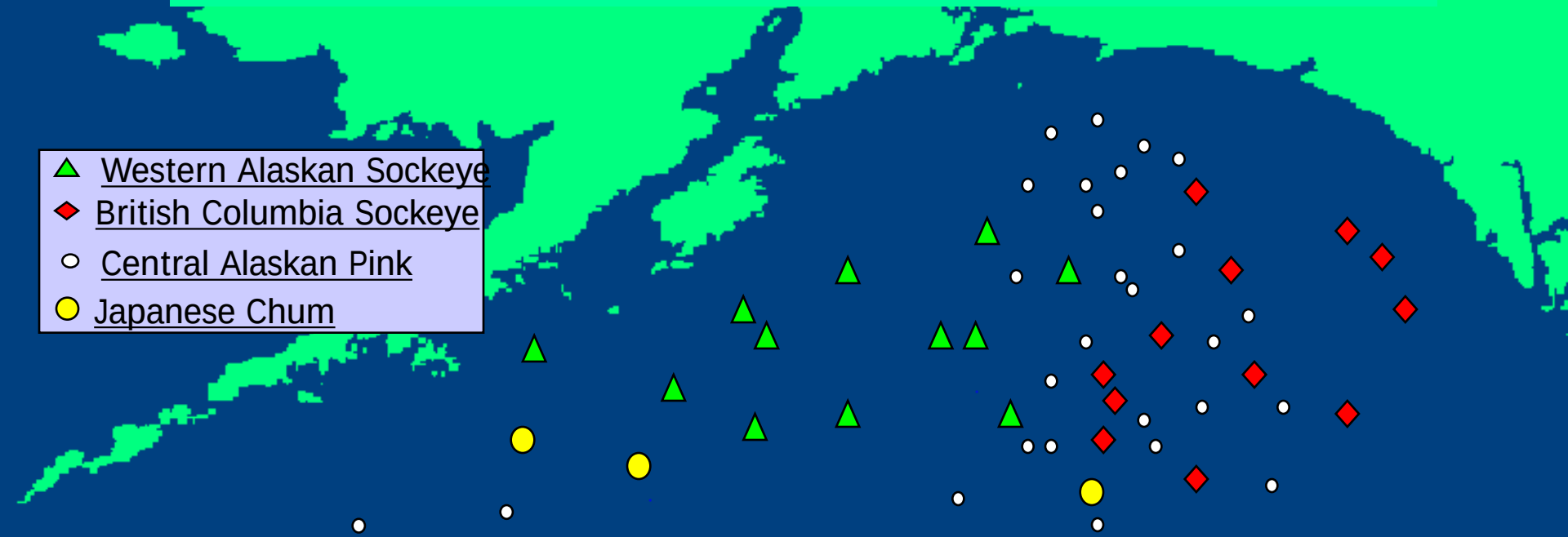
Copepods

Pteropods

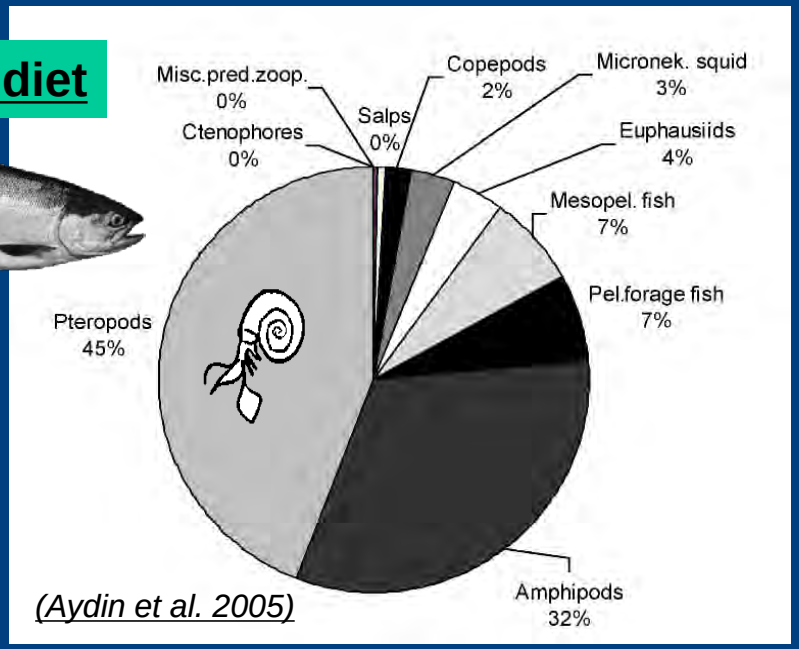
Pacific Salmon

Feely 2009

NMFS Research: Modeled Impacts of OA on Pacific Salmon



Pink salmon diet



(Aydin et al. 2005)

Predicted effect of climate change on pink salmon growth:

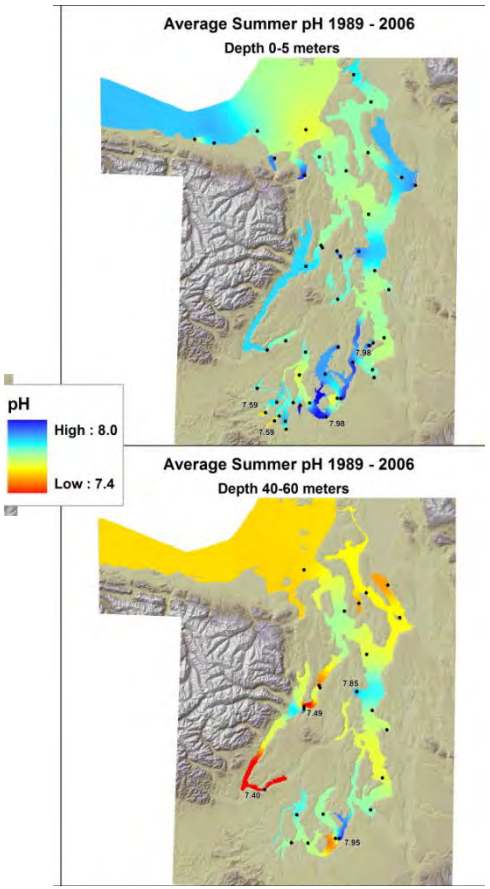
•10% increase in water temperature leads to 3% drop in mature salmon body weight (physiological effect).

•10% decrease in pteropod production leads to 20% drop in mature salmon body weight (prey limitation).

Feely 2009

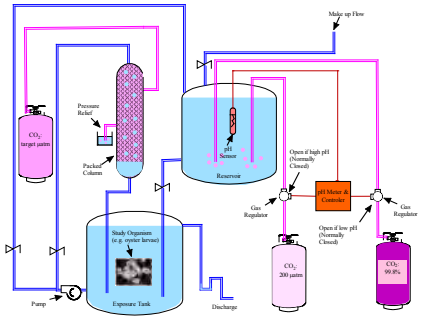
NMFS Research: Predicting ecological effects of OA

1 Patterns of acidification

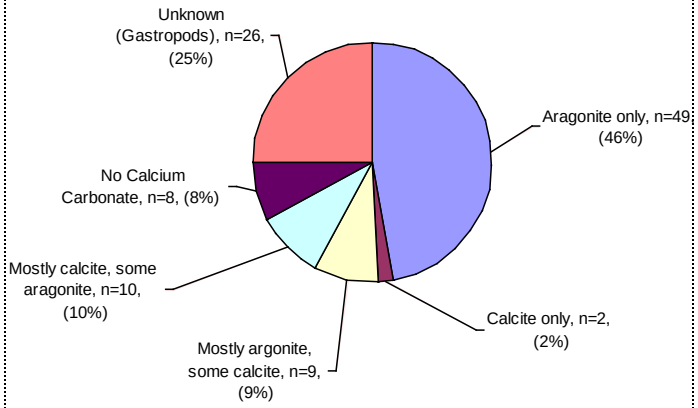


e.g. Puget Sound pH maps

2 Estimating species vulnerability

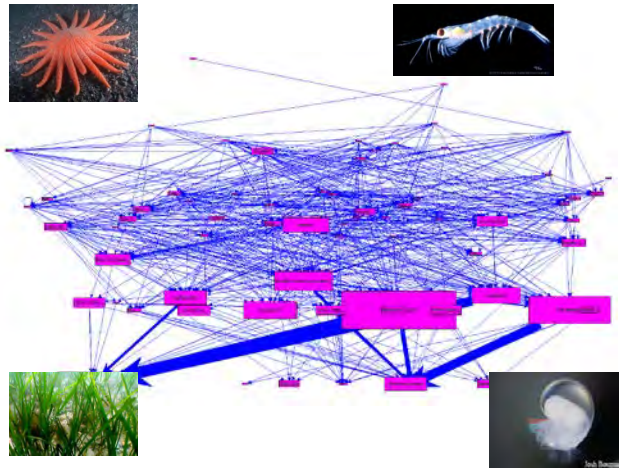


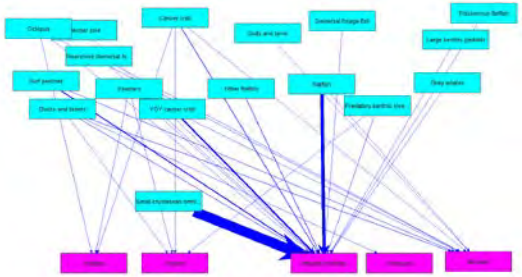
e.g. Treatment experiments



e.g. Survey of mineralogy of Puget Sound mollusks

3 Impacts on food webs





e.g. Complete and bivalve-centric Puget Sound food webs

Collaboration topics to consider…

- Designing specific habitat restoration strategies?
- Are there key populations we need to protect?
- Snake River spring/summer Chinook – how do we recover stocks in wilderness in the face of climate change?
- Klamath, Rogue, Umpqua – do we treat these rivers as refugia for recolonization?
- Can the rate of climate change swamp phenotypic plasticity?

DOI Climate Change elements

NOAA Climate Services

DOI Climate Change Response Council:
Secretary (Chair)
Deputy Secretary (Co-Chair)); Assistant Secretaries, Bureau Directors

Federal Land Agencies

Climate Change and Energy Task Force
(Deputy Asst. Secretaries. & Senior Level Bureau Staff)

Regional Climate Science Centers

Coordinated science and data delivery

- Climate modeling
- Monitoring / Data integration
- Downscaled modeling
- Forecasting
- Unified Monitoring and Data Collection

Landscape Conservation Cooperatives

Adaptation planning and decision support

- Vulnerability and risk assessments
- Ecosystem monitoring /modeling
- Strategic habitat conservation
- Scenario planning

Public Lands Carbon Project

Biological Carbon Sequestration

- Assessing carbon storage potential of DOI lands
- Promoting management strategies to enhance carbon benefits of natural landscapes

Geologic Carbon Sequestration

- Capture and geologic storage

Carbon Footprint Project

Unified GHG Emissions Reduction Program

- Efficiency programs across all DOI Bureaus
- Assessing visitor and concessions
- Activities on public lands

FY2010 – $10M Budget / Funding Elements

Establish Response Program and Project Funding

- **Climate Change Program Manager**
- **Climate Scientist**
- **Climate Change Communication Specialist**
- **Program Analyst**
- **Climate Change Assistant**

Provide service-wide coordination for policy, science, planning, mitigation, adaptation, and communication;

Seed money for prototype assessment and scenario planning

- **Project Funding ($3.0 M)**
  - **Targeted vulnerability assessment, scenario development, and adaption planning**
  - **Competitive projects**

- **Internship and Fellowship Programs**

FY2010 – $10M Budget / Funding Elements

Enhance Existing Network Monitoring Capacity

- **Climate Change Monitoring Coordinator**
- **Climate Change Ecologist**
- **Enhanced Monitoring ($1.6 M)**
  - **High Elevation**
  - **North Atlantic Coastal**
  - **South Atlantic Coastal**
  - **Pacific Island**
  - **High Latitude (Alaska)**
  - **Arid Lands**

Leverage Vital Signs network capacity; Partner with others to enhance monitoring and data integration

- **Ecosystem Modeling ($200 K)**
  - **Joint project with NSF, NASA, FWS, USGS**

- **Unified Monitoring and Data Collection ($550 K)**

FY2010 – $10M Budget / Funding Elements

Adaptation Strategies

- National Adaptation Coordinator
- Cultural Resource Adaptation Specialist
- Landscape Ecologist
- Resource Planner (.5 FTE)
- Energy Coordinator
- Landscape Adaptation Coordinators at LCCs
  - Northern Rockies
  - Pacific Islands
  - South Atlantic
  - North Atlantic
  - Urban Parks
- Climate Adaptation Scientists at Climate Science Centers
  - Alaska
  - Pacific Northwest
  - Southwest (2011?)

Implement high priority park and regional adaptation and mitigation projects; Coordinate with other bureaus and agencies to build [DOI] Climate Science Centers and Landscape Conservations Cooperatives

National Park Service
U.S. Department of the Interior

Climate Change Response Program

National Park Service

Climate Change Response Strategy

DRAFT January 2010

Summing Up

- NPS is committed to landscape collaboration for promoting climate change adaptation and mutual learning

- NPS does not have the funding that others have; we have fewer positions so we are trying to be strategic

- NPS Science Initiative will help build climate change adaptation capacity in the agency

- We are building an adaptation network and we encourage partners in the CESU to engage in discussions and action at the regional and national levels

- Nobody has the answers; this is new - it is an opportunity to help shape a direction

USDA-NRCS Atmospheric Change Activities

Greg Johnson
Leader, Air Quality & Atmospheric Change Technology Development Team

USDA-NRCS-WNTSC
Portland

April 29, 2010

Who We Are

Air Quality & Atmospheric Change Team:

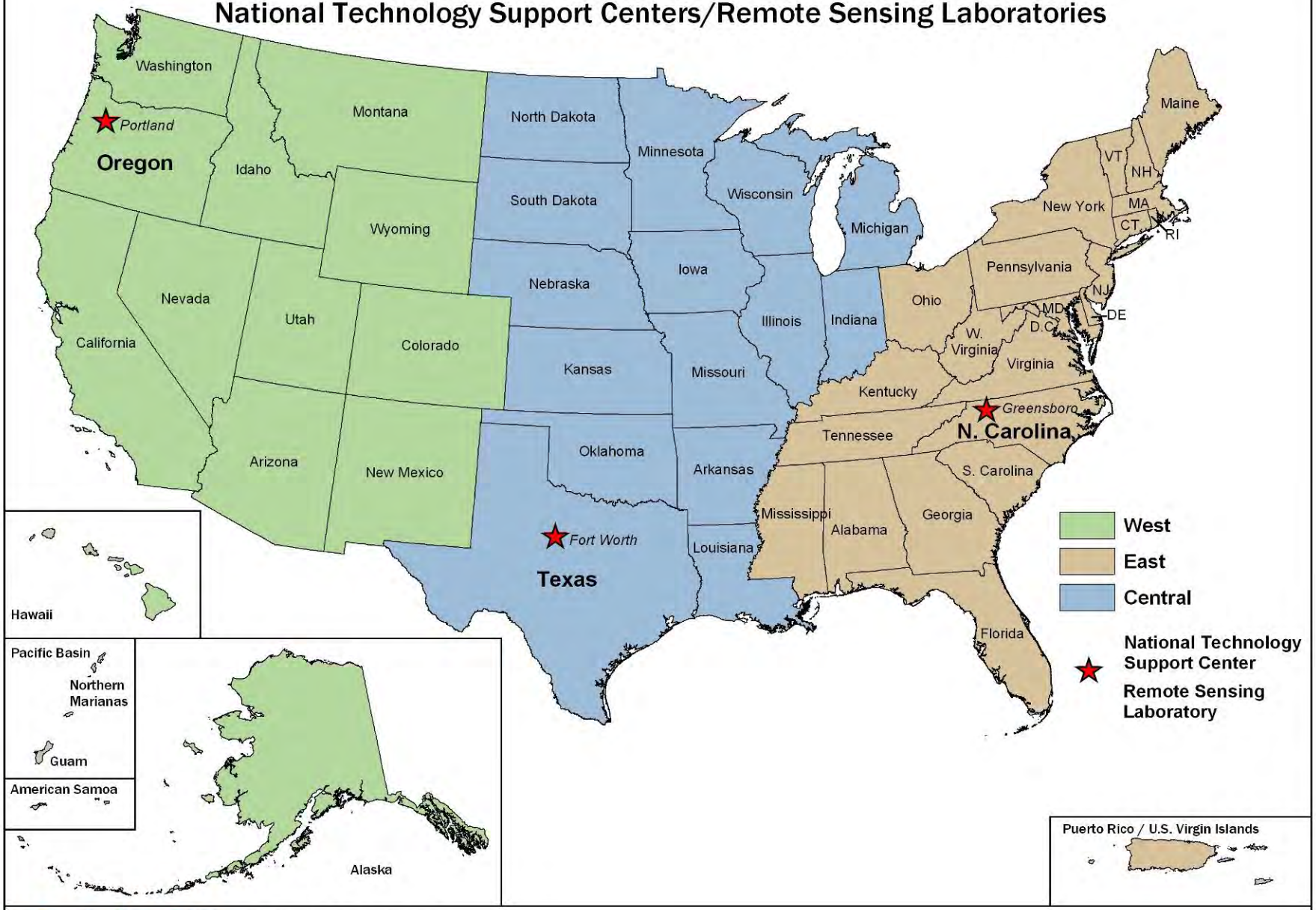
- Greg Johnson, Leader
- Susan O'Neill, Air Quality Scientist
- Greg Zwicke, Air Quality Engineer
- Air Quality Scientist (vacant)

also…

Michele Laur, Nat'l Atmos Resource Specialist (ESD, NHQ)
Ron Heavner, Nat'l Air Quality Specialist (CED, NHQ)

NRCS

Natural Resources Conservation Service
National Technology Support Centers/Remote Sensing Laboratories



U.S. Department of Agriculture
Natural Resources Conservation Service
Resources Inventory Assessment Division
Washington, D.C. April 2007

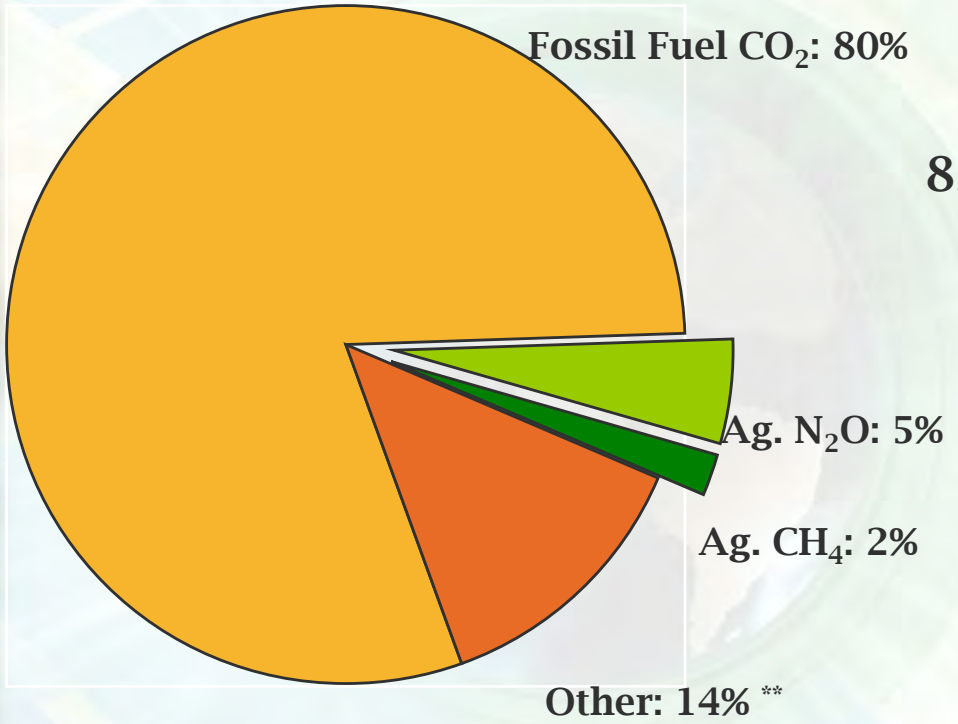
Why an emphasis on Air Quality and Atmospheric Change?

- New and emerging areas of focus for the NRCS
- Increasing AQ regulatory pressure on agriculture
- Increasing emphasis on greenhouse gases
- We tend to stovepipe resource analyses
- Examination of how air quality and atmospheric change are related to other resources (SWAPA+H)

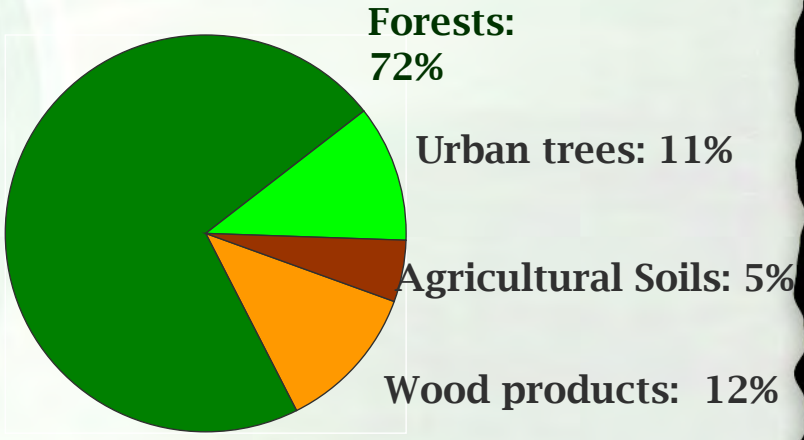
NRCS

Within the US:
Agriculture accounts for 7 % of GHG emissions
Carbon sequestration offsets 11 % of U.S. emissions

U.S. GHG Emissions:
7,260 million metric tons CO_2e

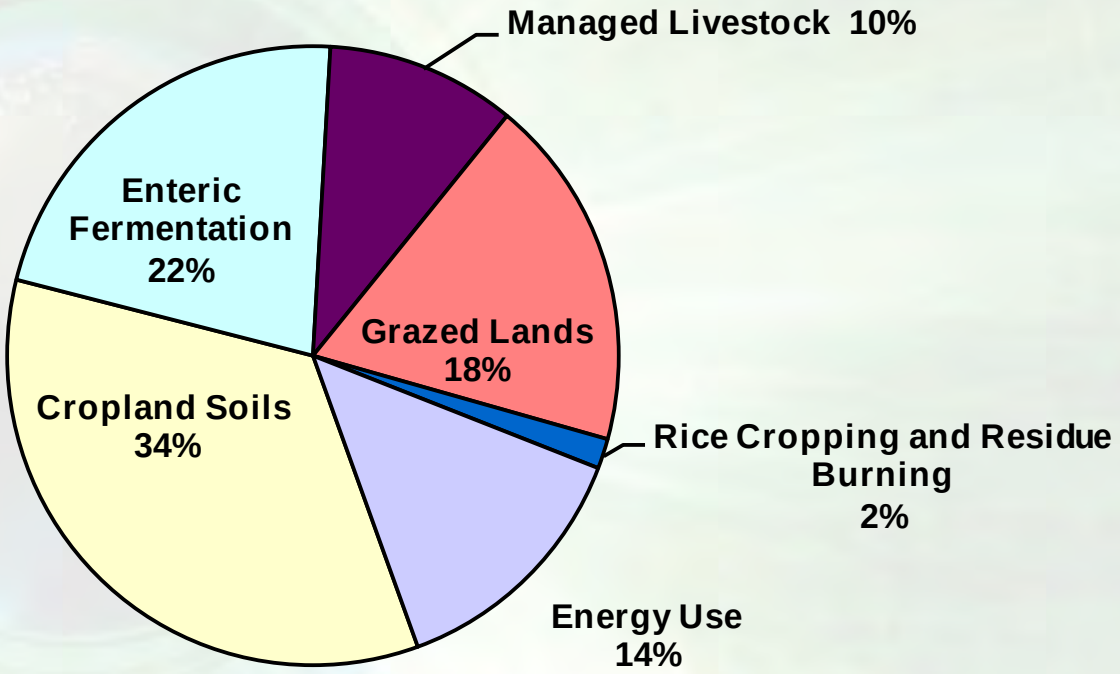


U.S. Carbon Sequestration:
828.5 million metric tons CO_2e



Source: US EPA. 2007. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2005

Within agriculture: Half of emissions are from livestock and grazing, A third are from cropland nitrogen, and the remainder from energy use and small sources



U.S. Agriculture and Forestry Greenhouse Gas Inventory: 2005

AQAC and NRCS Planning

NRCS works with private landowners nationwide to conserve natural resources

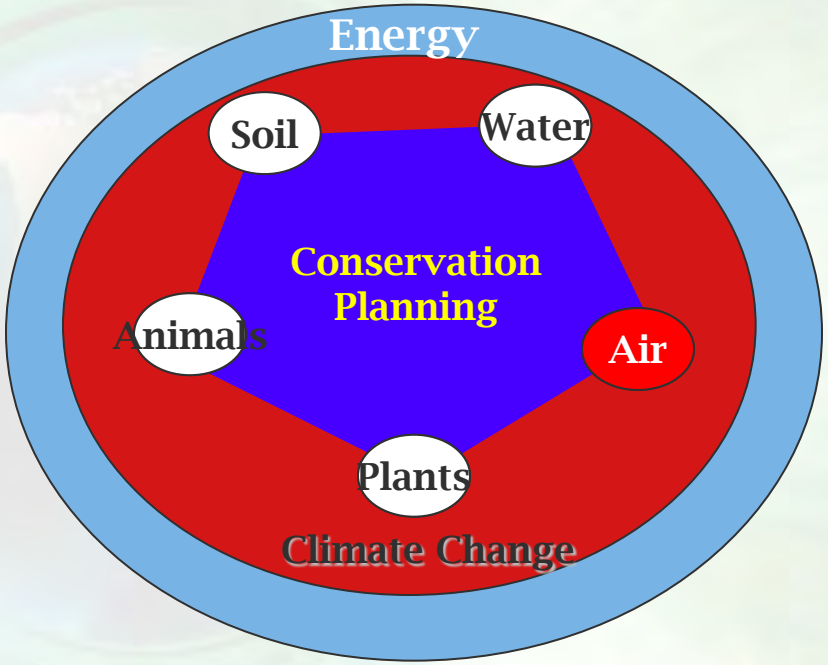
Conservation practices and systems are used to address resource concerns. One of the 4 AQAC resource concerns is Greenhouse Gases and Carbon Sequestration

There are nearly 170 conservation practice standards. Several have significant relationship to GHG/carbon (nutrient management, residue management, combustion system improvement, anaerobic digester, etc.)

NRCS

Addressing Air Quality: The Holistic Approach to Addressing Resource Issues

Air Quality, Energy and Climate Change are Integral in the Total System



Climate Change & NRCS

- Now one of the few agency Strategic Initiatives directly reporting to the Chief
- Have established 2 climate change-related teams to address these issues
- NRCS Programs GHG benefits analysis
  - For 2002, 2007, and out to 2020
- Now making plans for potential climate change legislation
  - Eligible practices and GHG/carbon seq. effects
  - Developing credit schemes

NRCS

Climate Change & NRCS

- Oversight of the CarbOn Management Evaluation Tool for the voluntary reporting of GHGs (COMET-VR): Developed by Colorado State University, ARS and NRCS. Utilizes Century soil organic model
  - www.cometvr.colostate.edu
- Soil Survey Division conducting the Rapid Assessment of U.S. Soil Carbon for Climate Change and Conservation Planning
- National Water and Climate Center at NRCS Portland examining climate variability/change effects on Western snow and water supply forecasts

NRCS

NRCS Programs and GHGs/Carbon

- NRCS administers a variety of conservation programs, including the Environmental Quality Incentives Program (EQIP), the Conservation Stewardship Program (CSP), etc.
- EQIP funding now nearly $2 billion
- Clear language in Farm Bill to address carbon market
- Prioritizing new and innovative approaches to manage GHG emissions and enhance sequestration

NRCS

Approaches to Greenhouse Gas Regulation

Traditional Command and Control

- Regulatory agency sets standards
  - Specific technologies (scrubbers)
  - Performance (tons, tons/unit output)

Cap and Trade

- Regulatory agency sets overall objective (total allowable emissions)
  - Allocates or auctions emission allowances
  - Firms must obtain allowances in order to emit a pollutant
    - Firms can receive allowances, purchase allowances, or reduce emissions

Cap and Trade with Offsets

- Unregulated firms can receive credits for reducing emissions
- Regulated firms can purchase offset credits to meet regulatory requirements ("offsetting emissions")

NRCS

Issues with Offsets

Offsets are produced by entities that are not regulated:

- Would the action have happened anyway? (Additionality)
- Will other firms/entities fill gaps if the action results in a drop in production? (Leakage)
- What are we measuring benefits against? (Baselines/benchmarks)

Carbon sequestration is unique:

- Will the carbon that is sequestered and stored be kept out of the atmosphere? (Permanence)

Most agriculture and forestry sources and sinks are not well defined "point" sources:

- Can we truly assess the benefits? (Measurement uncertainties)

NRCS

Steps in Determining Carbon Offsets

Determine eligible practices

Establish metrics for quantifying greenhouse gas benefits

Establish reporting requirements

Provide technical assistance – technical service provision to assist in planning and implementation

Certify implementation

Maintain registry of information, recordkeeping, including ensuring against duplicate records

Conduct audits and spot checks

Award offsets or issuance of incentive payments

Monitor against loss of carbon that is sequestered

NRCS

Agriculture and Forestry in HR 2454

Specifies schedule of annual GHG emissions caps for covered sectors from 2012 to 2050.

Covered sectors account for 85% of current US GHG emissions

Cap would reduce emissions from covered sectors:

17% by 2020, 42% by 2030, 83% by 2050

Provides for agriculture and forestry to supply offsets:

- USDA would administer the offsets program;
- Caps the use of domestic offsets at 1 billion tons of CO2e per year;
- Requires offsets account for: Leakage, Permanence, Additionality, and Uncertainties

Provides support for expanded use and production of renewable energy

NRCS

Costs and Benefits of HR 2454 to Agriculture

Main costs

- Higher prices for energy and energy intensive inputs (including fertilizer)

- Fertilizer and fuel costs account for 50-60 percent of variable costs of production for corn;
- Rural households have higher personal transportation expenditures than urban households. Would be more negatively impacted by increased gas prices.

Main benefits: Potential revenue from supplying

- Offsets to covered industries,
- Clean energy and clean energy feedstocks

NRCS

NRCS, USDA, Agriculture Climate Change-related Research Needs

- More research about N_2O emissions changes associated with conservation practices
- Whole-farm lifecycle analyses for properly evaluating new technologies addressing GHG/carbon management
- Possible collaboration with National Water and Climate Center on better snow and water forecasts for the West

Questions?

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The USGS in the Northwest: Structure and Climate Science

A presentation to the PNW CESU
April 29, 2010

"The USGS serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life."

Lief Horwitz
Northwest Area Science Program Officer
lief_horwitz@usgs.gov
206 220 4616

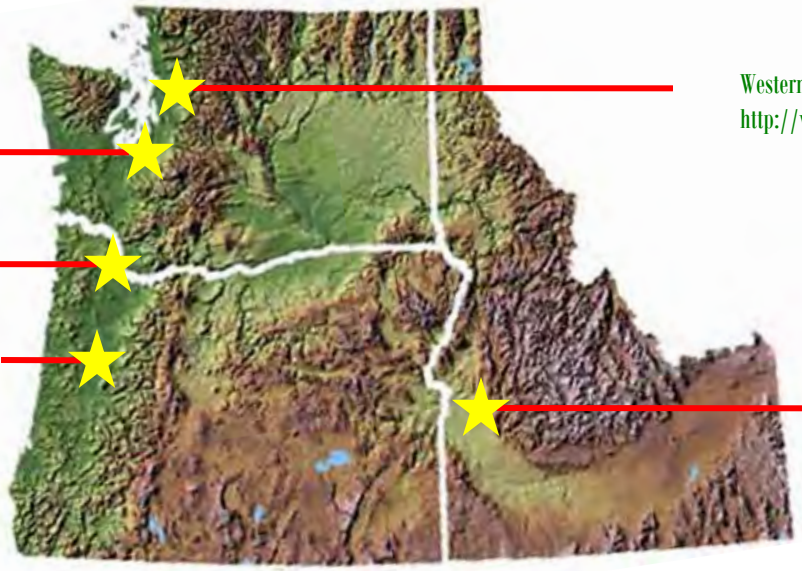
USGS
science for a changing world

Presentation Overview

- USGS in the Northwest
- Regional Climate Impacts: Northwest
- DOI Response to Climate Change
- USGS NW CC Infrastructure
- USGS Science
- The Psychology of Climate Change Communication
- C3 (separate handout)
- The PNW CESU and Climate Change Collaboration

The USGS Northwest Area

The USGS NW Area Office coordinates a three state region, linking the USGS field operations of five Science Centers with other components of the organization and the Survey's varied and diverse partners



Western Fisheries Research Center (WFRC)
http://wfrc.usgs.gov/

Washington Water Science Center (WA WSC)
http://wa.water.usgs.gov/

Oregon Water Science Center (OR WSC)
http://or.water.usgs.gov/

Forest and Rangeland Ecosystem Science Center (FRESC)
http://fresc.usgs.gov/

Idaho Water Science Center (ID WSC)
http://id.water.usgs.gov/

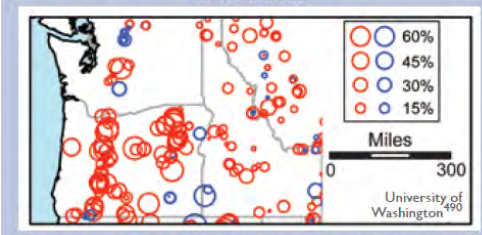
Regional Climate Impacts: Northwest

U.S. Global Change Research Program (USGCRP) Scientific Assessment

"The Northwest's rapidly growing population, as well as its forests, mountains, rivers, and coastlines are already experiencing human-induced climate change and its impacts. Regionally averaged temperature rose about 1.5°F over the past century (with some areas experiencing increases up to 4°F) and is projected to increase another 3 to 10°F during this century"

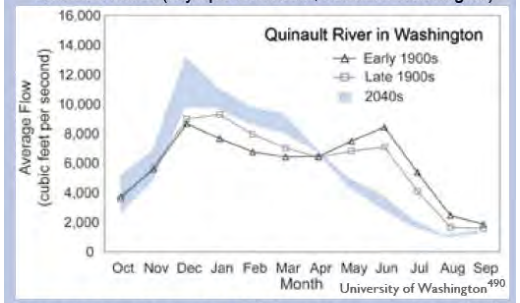
- Increased insect outbreaks, wildfires, and changing species composition in forests will pose challenges for ecosystems and the forest products industry
- Declining springtime snowpack leads to reduced summer streamflows, straining water supplies
- Salmon and other coldwater species will experience additional stresses as a result of rising water temperatures and declining summer streamflows
- Sea-level rise along vulnerable coastlines will result in increased erosion and the loss of land

Trends in April 1 Snow Water Equivalent
1950 to 2002



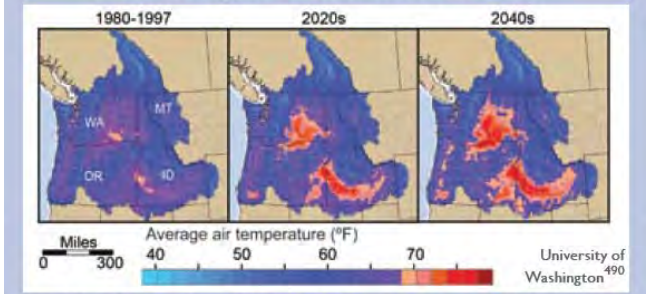
April 1 snowpack (a key indicator of natural water storage available for the warm season) has declined throughout the Northwest. In the Cascade Mountains, April 1 snowpack declined by an average of 25 percent, with some areas experiencing up to 60 percent declines. On the map, decreasing trends are in red and increasing trends are in blue.[491]

Shift to Earlier Peak Streamflow
Quinault River (Olympic Peninsula, northern Washington)



As precipitation continues to shift from snow to rain, by the 2040s, peak flow on the Quinault River is projected to occur in December, and flows in June are projected to be reduced to about half of what they were over the past century. On the graph, the blue swath represents the range of projected streamflows based on an increase in temperature of 3.6 to 5.4°F. The other lines represent streamflows in the early and late 1900s.[487,494]

Decreasing Habitat for Coldwater Fish



Increasing air temperatures lead to rising water temperatures, which increase stress on coldwater fish such as trout, salmon, and steelhead. August average air temperature above 70°F is a threshold above which these fish are severely stressed. Projected temperatures for the 2020s and 2040s under a higher emissions scenario suggest that the habitat for these fish is likely to decrease dramatically.[486,497,568,569]

http://www.globalchange.gov/images/cir/pdf/northwest.pdf

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science for a changing world

An Integrated DOI Response to Climate Change

THE SECRETARY OF THE INTERIOR
WASHINGTON

ORDER NO. 3289 (Sept, 2009)
Subject: Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources

- **Coordinated Approach:** Overseen by Office of Secretary's Climate Change Response Council -- consisting of Departmental Leaders and Agency Directors.
- **Objective:** Increase scientific understanding of and development of adaptive management tools to address CC impacts upon natural and cultural resources.
- **Approach:** Must be integrated into long-range planning requirements, priority setting for scientific research, development of management plans and major decisions regarding usage of resources.
- **Regional Climate Change Response Centers:**
  - Designed to provide CC impact data and analysis geared toward the needs of F&W managers as they develop adaptation strategies in response to CC.
  - Developed in close collaboration with Interior agencies and other federal, state, university, and non-governmental partners.
- **Landscape Conservation Cooperatives:**
  - Interior bureaus and agencies, guided by the Climate Response Council, will work to stimulate the development of a network of collaborative Landscape Conservation Cooperatives.
  - Cooperatives will work interactively with the relevant DOI RCCRCs and help coordinate adaptation efforts in the region.

An Integrated DOI Response to Climate Change (cont.)

Creation of Energy and Climate Change Council for Oversight and Coordination of Department-wide Response to Climate Change

U.S. Department of the Interior

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DOI Home > What We Do > Climate Change > Strategy

Strategic Response to Climate Change

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Climate change is driving rapid and broad changes across the United States and the world. As the nation's primary land, water and wildlife manager, the U.S. Department of the Interior has an obligation to address the impacts that climate change is having on America's resources by developing effective adaptation and mitigation strategies.

We are fulfilling this obligation by investing in scientific research to better understand climate-change impacts, designing science-based strategies to protect our resources and people from climate change, and decreasing greenhouse-gas emissions into the atmosphere.

- Examples of this work include:Adapting our water-management strategies to address the possibility of shrinking water supplies and more frequent and extended droughts to continue to supply drinking water to more than 31 million people and irrigation water to 140,000 farmers;
- Creating science-based strategies to conserve and manage fish and wildlife resources, including more than 800 native migratory bird species and nearly 2,000 threatened and endangered species;Protecting cultural and archaeological resources and iconic structures that may be affected by climate change;
- Addressing the impacts of climate change on American Indians and Alaska Natives;
- Reducing greenhouse-gas emissions from Interior buildings, vehicles, and operations, and through innovative land-use management practices.

Climate Science Centers (Interactive map)

Landscape Conservation Centers (Interactive map)

Secretarial Order No. 3289: Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources.

With his signing of Secretarial Order No. 3289 on Sept. 14, 2009, Interior Secretary Ken Salazar launched a climate-change-response strategy large and bold enough for us to meet these challenges. His order provides us with the framework to coordinate efforts among our Interior bureaus and to integrate our science and management expertise with that of our partners.

Two new initiatives – DOI Climate Science Centers and Landscape Conservation Cooperatives – form the

- Climate Science Centers
- Landscape Conservation Cooperatives
- Data Integration and Management
- Carbon Storage Activities
- Geological Sequestration
- Biological Sequestration

http://www.doi.gov/whatwedo/climate/strategy/index.cfm

Climate Science Centers (CSCs)

Delivering Fundamental Climate-Impact Science to Resource Managers on a Regional Basis

- National Climate Change and Wildlife Center at USGS HQ & Eight regional Climate Science Centers (CSCs)
- Provide scientific information, tools and techniques for land, water, wildlife and cultural resource managers to adapt to climate and ecologically-driven responses at regional-to-local scales.
- Deliver basic climate-change-impact science to Landscape Conservation Cooperatives
- Prioritize fundamental science, data and decision-support activities to meet the needs of the LCCs.
- Work with the LCCs to develop adaptive management and other decision-support tools for managers.

Landscape Conservation Cooperatives (LCCs)

On-the-Ground Applied Science and Adaptive Management

- Twenty-One Nationwide, functioning within a specific landscape as part of a national and international network
- Focus on-the-ground strategic conservation & adaptive management efforts at the landscape level.
- Management-science partnerships that inform integrated resource-management
- Link science and conservation delivery
- LCCs are cooperatives, formed and directed by land, water, wildlife and cultural resource managers and other stakeholders.
- Steering committees will include representatives from governmental entities (federal, state, tribal and local), as well as non-governmental organizations.

Climate Science Centers (CSCs)

http://www.doi.gov/whatwedo/climate/strategy/CSC-Map.cfm

STATUS

- Three in FY2010 - Alaska (Univ of Alaska), Northwest and Southeast
- Individual RCSC budget ~$4m (25% for staff and space; 75% for climate change science)
- The USGS Area RExs will Chair the Steering Committee/Governance Board for their Area's respective CSC.
- USGS will provide an Interim Director prior to the selection (via Program Announcement) of the host institution

Landscape Conservation Cooperatives (LCCs)

http://www.doi.gov/whatwedo/climate/strategy/LCC-Map.cfm

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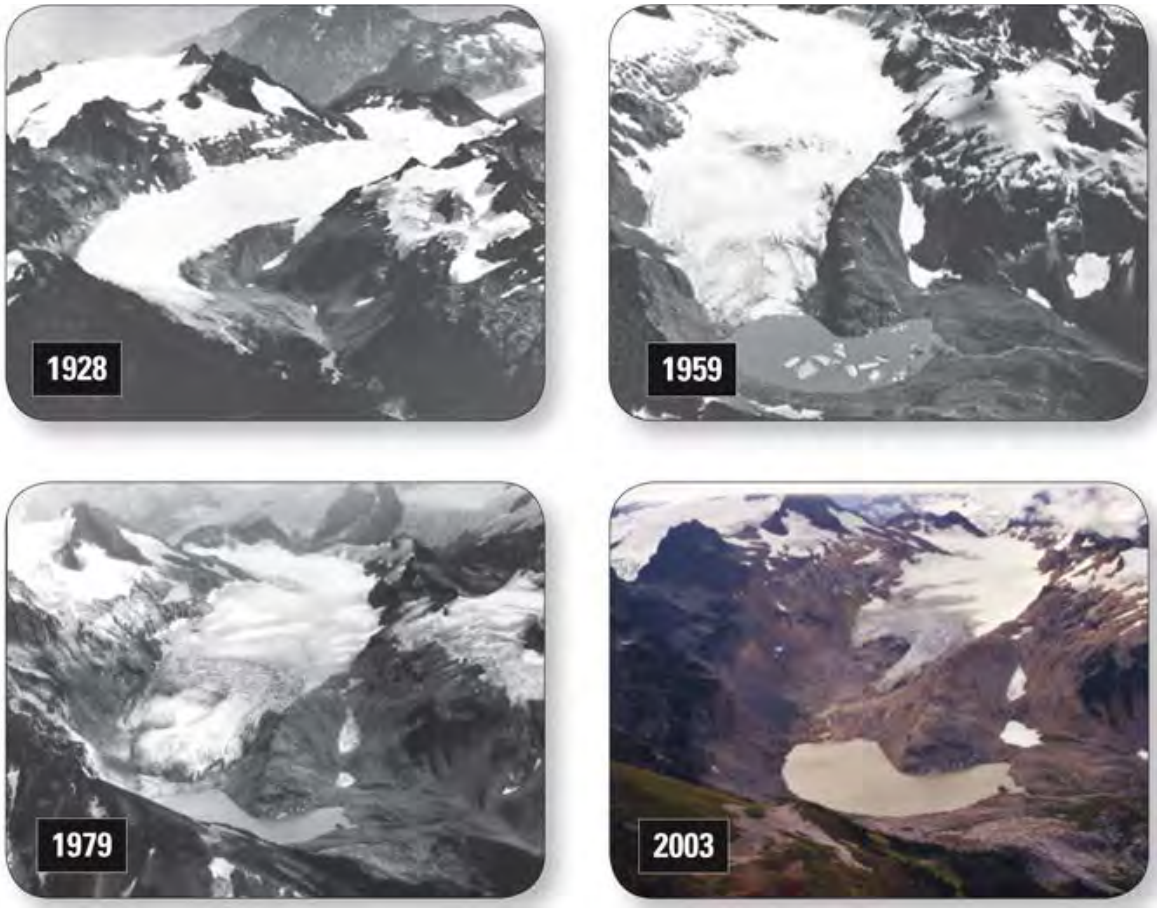
USGS NW CC Infrastructure

- Multiple Science Centers and Field Stations
- NW RCSC (future)
- Annual Science RFPs (Global Change & NCCWSC)
- Funding for LCC Science Capacity
- Climate Effects Networks (future)
- Dedicated program dollars

USGS Science: Glacier Recession as an Indicator of Mountain Protected Area Responses to Climate Change



Retreat of South Cascade Glacier, Washington, during the 20th Century and the beginning of the 21st Century

(Ed Josberger)

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USGS Science : How might future increased temperatures affect hot and cold desert fire regimes?

- Climatic models predict increasing temperatures.
- Conditions in higher elevation and more mesic shrublands may become more conducive to dominance by non-native grasses and the grass/fire cycle (move upslope).
- Start winter growing season sooner that should favor weedy non-native plants.
- Increase the length and aridity of the summer fire season.

(Matt Brooks)

Brooks and Matchett in review

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science for a changing world

The Psychology of Climate Change Communication

1) What is their knowledge/beliefs

2) Make the message relevant

3) Translate

4) Understand people's "finite pool of worry"

5) Address uncertainties and consider the interpretation of scientific language (i.e. Uncertainty (range) = not knowing , Positive trend (upward trend) = a good trend)

6) The importance of group affiliation

7) Bring people together

8) Simplify and make change attainable

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C3

Pacific Northwest
Climate Change Collaboration (C^3)

I. Purpose: The Climate Change Collaboration (C^3) is intended to better organize, integrate, and focus the federal community's efforts in addressing the challenges posed by climate change in the Pacific Northwest region. C^3 is a regional forum, designed to complement the framework of the multi-agency U.S. Global Change Research Program (formerly the U.S. Climate Change Science Program). Key to the success of this framework is the pursuit of activities that:

- Are coordinated and avoid duplication of similar national or regional efforts;
- Remain relevant into the future;
- Are sustainable and manageable; and
- Assist federal entities in meeting their current and future needs and responsibilities regarding climate change.

II. C^3 Objectives:

- Serve as a forum to strengthen and enhance federal coordination on climate change related issues;
- Create a regional network of key federal employees working on climate change issues;
- Engage top agency executives and managers to encourage effective alignment of resources and programs that address climate change;
- Share information about regional conferences, workshops, and other activities organized by participating agencies to avoid duplication;
- Share and exchange information on climate change related grants and scientific studies funded and/or managed by federal agencies in the region;
- Exchange and coordinate climate change tools, data and information, best practices and scientific knowledge in the region; and
- Encourage federal coordination with tribal, state, and local, government, NGOs, and private partners.

III. Geographic Scope and Coordination with other Efforts: C^3's efforts are focused in Washington, Oregon and Idaho. C^3 is designed to compliment other Pacific NW regional efforts and related efforts in Alaska, California, Hawaii and the Pacific Islands.

IV. Near Term Focus: C^3 members have formed two interagency teams to focus on:

- Inventorying research, research tools, models, modeled scenarios, monitoring programs/projects and assessments related to climate change in the Pacific Northwest
- Education, outreach and partner engagement

Structured for Opportunities:
The PNW CESU and Climate Change Collaboration

Strengths

- Geographical alignment with the NWCSC and NPLCC, GNLCC and GBLCC
- A structure that allows for the efficient sharing of resources
- An established partnership with national coverage
- A bridge among Federal Agencies and Universities
- A Multi-faceted mission (research, technical assistance, and education)
- Multi-faceted expertise (biological, physical, social, and cultural sciences)

Opportunities

- Participation on/in LCC & RCSC Scoping Teams, Webinars, Workshops
- Connections/Participation with LCC & RCSC Steering/Work Teams
- Working with your Agency Reps on NW Interagency Collaborations (PSFC, CRFC, C3)
- Work with LCCs and RCSCs

Thank You!