

Greetings and welcome to the **March 2013** edition of the WDFW Climate News Digest. The purpose of this digest is to provide highlights of relevant climate change news, events and resources for WDFW staff. Feedback or suggestions for items to include in future editions are much appreciated – many *thanks* to those who have sent links and references and please keep them coming. Note that previous editions of the newsletter are now stored on the Habitat Program Sharepoint site --

<http://sharepoint.dis.wa.gov/dfw/habitat/climatechange/default.aspx>.

## WHAT'S HAPPENING AT WDFW?

### *Selected projects, agency resources and initiatives*

#### **Climate Change and Duwamish Salmon Habitat Planning**

Kirk Lakey (Habitat Program, Region 4) is working with WRIA 9 technical committee as the group considers whether and how climate change should be addressed in the update of the 2006 draft Duwamish Zone Blueprint, which provides guidance for salmon habitat restoration. A recent workshop brought together field-based experts to consider how climate information might be relevant and helpful to their habitat planning and restoration efforts. The goals were to review projections for sea level rise, Green River stream flows, and temperature change; consider potential climate change impacts on Duwamish salmonid habitat restoration and planning and outline next steps for integrating climate change into Duwamish habitat restoration guidance, planning and implementation. Contact Kirk for more information.

#### **Climate Change and Skagit Workshop**

A number of WDFW staff participated in a two-day pilot workshop, titled “Achieving Fish Management and Salmon Recovery Goals in a Changing Climate”, held in Padilla Bay in late February. Our goals were to focus in on the Skagit watershed as a vehicle for better understanding how climate change will impact WDFW decisions and activities, AND taking the first step at identifying adaptation options to make our actions and decisions more resilient. We began with presentations from several members of the [Skagit Climate Science Consortium](#) – for those interested, most of these presentations are located on the habitat program sharepoint site, in a folder entitled “climate and salmon”. We followed up with small groups who worked to identify “climate sensitive decisions” for different WDFW focus areas (harvest management, hatcheries, restoration, HPAs, acquisition and fish passage). The small groups then fleshed out possible adaptation options and identified policy and science needs to support them. We are developing a summary and synthesis of the workshop findings, and also identifying next steps, which may include hosting a similar workshop on the eastside. For more information, please be in touch with Lynn. And many thanks to all who participated and helped with planning for the workshop!

#### **Bill Geer’s talk on Climate Change and Sportsmen**

Bill Geer, with the Theodore Roosevelt Conservation Partnership recently spoke in Olympia at the NRB about his experiences in discussing the impacts of climate change to fifteen sportsmen clubs across Washington State. If you missed the presentation, you can view it by clicking in

the link below.

<https://wadismetings.webex.com/wadismetings/lr.php?AT=pb&SP=MC&rID=64947182&rKey=bfbef9fd59d35209>

## CLIMATE ADAPTATION AT OTHER ORGANIZATIONS

### **Washington State Department of Ecology launches Climate Science Network**

To better coordinate and share climate change science, the Department of Ecology's Environmental Assessment Program is launching the **Ecology Climate Science Network**. The Network consists of selected Ecology technical staff with a goal of sharing scientific information to improve the agency's knowledge base about climate change. This could include greenhouse gas mitigation, climate change impacts and adaptation, and ocean acidification research and response. The Climate Science Network will support Ecology through the exchange of information, sharing updates on agency work that include climate change elements, exploring ways to better disseminate climate change science information, organize climate change science presentations at Ecology or at conferences and serve as technical support for emerging environmental issues with a climate change science component. For more information, contact Paul Pickett at [paul.pickett@ecy.wa.gov](mailto:paul.pickett@ecy.wa.gov)

### **NOAA Ocean Acidification Program**

The NOAA Ocean Acidification Program was officially established in May 2011. The NOAA OAP is an integral part of a much broader US research effort to increase our understanding about how (and how fast) the chemistry of the ocean is changing, how variable that change is by region, and what impacts these changes are having on marine life, people, and the local, regional, and national economies

### **EPA National Water Program Releases "2012 Highlights of Progress: Responses to Climate Change"**

The 2012 Highlights of Progress report provides a summary of the major climate change-related accomplishments of EPA's national and regional water programs in 2012. This is the fourth climate change progress report for the National Water Program and the first progress report organized around the five long-term programmatic vision areas described in the "National Water Program 2012 Strategy Response to Climate Change": water infrastructure; watersheds and wetlands; coastal and ocean waters; water quality; and, working with Tribes. The National Water Program released the "National Water Program 2012 Strategy Response to Climate Change" in December 2012 as an update to the initial climate change and water strategy released in 2008. To view the report, visit: <http://epa.gov/water/climatechange>.

### **U.S. Department of Agriculture Releases Climate Change Adaptation Plan**

The U.S. Department of Agriculture (USDA) Climate Change Adaptation Plan presents strategies and actions to address the effects of climate change on key mission areas including agricultural production, food security, rural development, and forestry and natural resources conservation. USDA's plan includes input from eleven USDA agencies and offices. It provides a detailed vulnerability assessment, reviews the elements of USDA's mission that are at risk from

climate change, and provides specific actions and steps being taken to build resilience to climate change. The plan can be downloaded in full or by section at:  
[http://www.usda.gov/oce/climate\\_change/adaptation/adaptation\\_plan.htm](http://www.usda.gov/oce/climate_change/adaptation/adaptation_plan.htm).

## LEARNING OPPORTUNITIES

**April 4, 11:00-12:00 (*pacific time*), “Environmental Variability in Acidification Stress, and Mechanisms for Biological Response”,** featuring Dr. Burke Hale, College of Earth, Ocean and Atmospheric Sciences, Oregon State University. More information about the topic, speaker and sign up information is available at the following link: [http://www.nodc.noaa.gov/seminars/2013/04-apr.html#OneNOAAScienceSeminars\\_04Apr2...](http://www.nodc.noaa.gov/seminars/2013/04-apr.html#OneNOAAScienceSeminars_04Apr2...)

**April 9, 11:00-1:00 (*pacific*), “Shared Solutions to Protect Shared Values: The National Fish, Wildlife and Plants Climate Adaptation Strategy”**

The recently National Fish, Wildlife, and Plants Climate Adaptation Strategy is the first nationwide strategy to help public and private decision makers address the impacts that climate change is having on our natural resources and the people and economies that depend on them. Join us to hear from the partners who developed this effort about how this Strategy provides a unified approach for reducing the negative impacts of climate change on natural systems, and discuss key recommendations for safeguarding the nation’s fish, wildlife and plants in a changing climate. For more information on the Strategy, visit: [www.wildlifeadaptationstrategy.gov](http://www.wildlifeadaptationstrategy.gov)

YOU MUST **REGISTER** ([at this link](#)) to join the webinar. This webinar will be recorded for future viewing. If you cannot attend the webinar it will be posted approximately 1-2 weeks after the presentation is given at [www.wildlifeadaptationstrategy.gov](http://www.wildlifeadaptationstrategy.gov)

**April 17, 10:00 (*pacific*), “Modeling potential range shifts under a changing climate: A case study”** with Scott D. Klopfer, David Kramar, Chris Burkett and Austin Kane. You must register in advance to attend this webinar -- find the link [here](#).

**April 15-18. [2013 Western Division of the American Fisheries Society Annual Meeting](#) , Boise, ID** features a climate-aquatics symposium organized by Dan Isaak and colleagues, titled **“New information regarding climate effects on aquatic resources: how do we use this information?”** Also, a 1-day workshop on spatial statistical model for stream networks will be held in conjunction with the meeting. Contact Dan Isaak for online participation if you cannot attend or for more info: [disaak@fs.fed.us](mailto:disaak@fs.fed.us)

## RESOURCES

[National Fish, Wildlife, and Plant Climate Change Adaptation Strategy Released](#)

**(see April 9<sup>th</sup> webinar opportunity above)**

In partnership with state and tribal agencies, the Obama Administration has released the first nationwide strategy to help public and private decision makers address the impacts that climate change is having on natural resources and the people and economies that depend on them. Developed in response to a request by Congress, the National Fish, Wildlife, and Plants Climate Adaptation Strategy is the product of extensive national dialogue that spanned nearly two years and was shaped by comments from more than 55,000 Americans. The strategy can be found at: [www.wildlifeadaptationstrategy.gov](http://www.wildlifeadaptationstrategy.gov).

### **Quick Guide to Climate-Smart Restoration**

Climate-Smart Conservation is the intentional and deliberative consideration of climate change in natural resource management, realized through forward-looking goals and linking actions to key climate impacts and vulnerabilities. Attached is a new “quick guide” to climate smart conservation (also available at the link provided). This guidance is the product of a workgroup convened by National Wildlife Federation consisting of experts in climate adaptation. Training based on this guidance will be offered through the U.S. Fish and Wildlife Service’s National Conservation Training Center (<http://training.fws.gov/>). For additional information about the forthcoming guide to climate-smart conservation and other NWF climate adaptation efforts please visit: [www.nwf.org/climate-smart](http://www.nwf.org/climate-smart).

### **Effects of Climatic Variability and Change on Forest Ecosystems: A Comprehensive Science Synthesis for the U.S. Forest Sector**

This report is a scientific assessment of the current condition and likely future condition of forest resources in the United States relative to climatic variability and change. It serves as the U.S. Forest Service forest sector technical report for the National Climate Assessment and includes descriptions of key regional issues and examples of a risk-based framework for assessing climate-change effects. USDA, Dec 2012

### **Primer for Identifying Cold-Water Refuges to Protect and Restore Thermal Diversity in Riverine Landscapes** (Torgerson et al, 2012)(attached)

Cold-water refuges in rivers and streams have physiological and ecological significance because temperature is the driving factor that determines the metabolic rates of cold-blooded animals, such as fish and the organisms on which they feed. Because fish and invertebrates have specific ranges of thermal tolerance, increases in water temperature as a result of human modification of the natural thermal regime may require fish and invertebrates to move to areas that are more thermally suitable. The purpose of this primer is to provide an overview of cold-water refuges in river systems for the protection of salmon and trout. The primer provides instruction on what cold-water refuges are, how to identify them, how they function, and how they can be protected and restored.

## **CLIMATE SCIENCE NEWS**

**[European satellite confirms UW numbers: Arctic Ocean is on thin ice](#)**

Combining a UW model and new satellite observations suggests the summer minimum in Arctic sea ice is one-fifth of what it was in 1980, when the model begins. “...people had argued that 75 to 80 percent ice volume loss was too aggressive,” said co-author [Axel Schweiger](#), a polar scientist in the UW Applied Physics Laboratory. “What this new paper shows is that our ice loss estimates may have been too conservative, and that the recent decline is possibly more rapid.”

### [Ocean acidification in the California Current; predicting impacts on food webs and economies within a context of climate change](#)

EPOCA, the European Project on Ocean Acidification is supporting the development of a management model to predict impacts of ocean acidification on food webs and the fishing economy in the California Current. The model will project how effects of ocean acidification, low oxygen, temperature changes, and fishing pressure might interact to influence fish populations and fishing economies.

### **Natural Climate Swings Contribute More to Increased Monsoon Rainfall Than Global Warming**

Natural swings in the climate have significantly intensified Northern Hemisphere monsoon rainfall, showing that these swings must be taken into account for climate predictions in the coming decades, a new study finds. The findings are published in the March 18 online publication of the *Proceedings of the National Academy of Sciences*. [Full Story.](#)

**Ongoing glacier loss in the Canadian high Arctic is accelerating and probably irreversible**, new model projections by Lenaerts et al. suggest.

The Canadian high Arctic is home to the largest clustering of glacier ice outside of Greenland and Antarctica -- 146,000 square kilometers (about 60,000 square miles) of glacier ice spread across 36,000 islands. [Full story](#)

## **SPECIES AND HABITATS**

### **Tangled Trends for Temperate Rain Forests as Temperatures Tick Up (pdf attached)**

Published in science findings, PNW Research Station, January 2013

Climate change is altering growing conditions in the temperate rain forest region that extends from northern California to the Gulf of Alaska. Longer, warmer growing seasons are generally increasing the overall potential for forest growth in the region. However, species differ in their ability to adapt to changing conditions. For example, researchers with Pacific Northwest Research Station examined forest trends for southeastern and southcentral Alaska and found that, in 13 years, western redcedar showed a 4.2-percent increase in live-tree biomass, while shore pine showed a 4.6-percent decrease. In coastal forests of Washington and Oregon, water availability may be a limiting factor in future productivity, with gains at higher elevations but declines at lower elevations

### **Restoring Salmon Habitat for a Changing Climate (Beechie et al, attached)**

An important question for salmon restoration efforts in the western USA is ‘How should habitat restoration plans be altered to accommodate climate change effects on stream flow and temperature?’ This paper describes a decision support process for adapting salmon recovery

plans that incorporates (1) local habitat factors limiting salmon recovery, (2) scenarios of climate change effects on stream flow and temperature, (3) the ability of restoration actions to ameliorate climate change effects, and (4) the ability of restoration actions to increase habitat diversity and salmon population resilience.

**[Disease and thermal acclimation in a more variable and unpredictable climate:](#)**

Few studies have considered the effects of changes in climatic variability on disease incidence. Now research based on laboratory experiments and field data from Latin America shows that frog susceptibility to the pathogenic chytrid fungus is influenced by temperature variation and predictability through effects on host and parasite acclimation. Raffel et al., Nature Climate Change, 3, pp.146-151 (2013) doi:10.1038/nclimate1659

**[Accommodating climate change contingencies in conservation strategy:](#)**

Species ranges are seldom at equilibrium with climate, because several interacting factors determine distribution, including demographic processes, dispersal, land use, disturbance (e.g., fire), and biotic interactions. Conservation strategies in a changing climate therefore cannot be based only on predicted climate-driven range shifts.... Increasingly, the capacity to react to a range of different scenarios, sensitivities, and ecological surprises will have to be accommodated. Building resilience in both ecosystems and institutions is therefore essential. Gillson et al., 2013, Trends in Ecology & Evolution March 2013, Vol. 28, No. 3, <http://dx.doi.org/10.1016/j.tree.2012.10.008>

**[Ocean acidification causes ecosystem shifts via altered competitive interactions:](#)**

Ocean acidification can alter competitive dynamics between species. This study found that although calcareous species recruited and grew at similar rates to fleshy seaweeds in ambient and low pH conditions, at later stages, in low pH, they were rapidly overgrown. These results suggest that changes in competitive balance could indirectly lead to profound ecosystem changes in an acidified ocean. Kroeker et al., Nature Climate Change, 3, pp.156-150 (2013) doi:10.1038/nclimate1680

**[Impacts of ocean acidification on marine seafood](#)**

Great review article on the chemistry behind ocean acidification and the direct and indirect effects to marine organisms. Branch et al., Trends in Ecology & Evolution, March 2013, Vol. 28, No. 3 <http://dx.doi.org/10.1016/j.tree.2012.10.001>

## **POLICY AND MANAGEMENT - MITIGATION AND ADAPTATION**

**Governor Inslee's statement on House passage of his climate action bill ([SB 5802](#)).**

"Today's bipartisan support for the climate action bill is welcome news. We've seen the impacts of climate change already affecting some of Washington's key industries with shellfish growers moving operations due to ocean acidification and the farmers in Eastern Washington seeing reduced water supplies as a result of reduced snowpack. This is our opportunity to not only make sure we protect those important industries, but also grow new jobs in the design and

manufacturing of clean energy. This bill is a collaborative, bipartisan step forward that will allow us to seize the environmental and economic opportunities of addressing climate change and preserve the legacy of stewardship we owe our children.” The climate action bill creates the climate legislative and executive work group to recommend a state program of actions and policies to reduce greenhouse gas emissions that if implemented would assure achievement of the state's emissions targets. It requires the office of financial management to contract with an independent and objective consultant, to prepare a credible evaluation of approaches to reducing greenhouse gas emissions.

### **[Bloomberg Announces Mayors’ Summit To Fight Climate Change](#)**

A summit of city mayors will convene in February of next year in Johannesburg, to discuss ways to fight global climate change. Mayor Michael Bloomberg, who serves as chairman of [the C40 Cities Climate Leadership Group](#), announced plans Tuesday along with Johannesburg Mayor Parks Tau for the fifth biennial C40 Cities Mayors Summit.” C40 was started in 2005 and is a network of cities around the world looking to implement local actions that can impact climate change. The group notes that while cities only occupy 2 percent of the whole land mass of the earth, they contain more than 50 percent of its population. Cities also use two thirds of the earths’ energy and generate over 70 percent of its carbon emissions.....

### **President's Council of Advisors on Science and Technology Release Six-Point Strategy on Areas of Focus for White House on Climate Change**

The President's Council of Advisors on Science and Technology has released a six-point strategy it believes the White House should focus on as addresses climate change. The report offers recommendations on both mitigation and adaptation aspects of addressing climate change. The six key components for consideration are: (1) focus on national preparedness for climate change; (2) continue efforts to decarbonize the economy, with emphasis on the electricity sector; (3) level the playing field for clean-energy and energy-efficiency technologies by removing regulatory obstacles, addressing market failures, adjusting tax policies, and providing time-limited subsidies for clean energy when appropriate; (4) sustain research on next-generation clean-energy technologies and remove obstacles for their eventual deployment; (5) take additional steps to establish U.S. leadership on climate change internationally; and, (6) conduct an initial Quadrennial Energy Review (QER). For further details, see:

[http://www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast\\_energy\\_and\\_climate\\_3-22-13\\_final.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast_energy_and_climate_3-22-13_final.pdf).