

Greetings and welcome to the **DECEMBER** 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 – *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*

### **Cascadia Oak Prairie Partnership Annual Meeting**

WDFW staff are working with the Cascadia Oak Prairie Partnership to develop a special climate change symposium as part of their annual meeting in March 2013 –“Managing Fragmented Prairie-Oak Habitats - Birds, Bugs, and Changing Communities”. WDFW staff will be working with other species and habitat experts in January to develop a draft framework for incorporating climate considerations into prairie restoration and land management. The March symposium will be an opportunity to work with practitioners and test the usability and practicality of the climate framework. Find the CPOP meeting information at <http://www.northwestscience.org/2012meeting>. For more information about the climate change symposium, or developing the climate/prairie restoration framework, please be in touch with Lynn.

### **Climate workshop at the Wildlife Program Meeting**

Bruce Thompson and Joe Buchanan hosted a climate change training session as part of the Wildlife Program all hands meeting in late November. The training included a presentation by Dr. Josh Lawler, who provided an overview of the most common strategies and concepts for climate adaptation in the world of natural resource management, with examples of current research projects for each. Dr Lawler's presentation can be found [here](#), at the [Wildlife Program Sharepoint site](#). The session also included small group exercises in which participants were asked to consider landscape resilience and vulnerability in the context of agency acquisition proposals.

### **Culverts and Climate Change**

WDFW staff are meeting this month with the [Climate Impacts Group](#) and staff from USFS to discuss options for developing WDFW guidance or best practices related to stream crossings and whether to incorporate future climate projections. The USFS recently worked with climate experts and their own staff to evaluate adaptation options for different operational aspects of the Olympic National Forest, including hydrology, roads, wildlife and fisheries – learn about the final report [here](#). As a result of this report, USFS staff has developed a draft strategy which they will be sharing with us, for addressing climate change considerations in culverts and bridge design. For more information on this project or for access to references we will be using, please contact Lynn.

## CLIMATE ADAPTATION AT OTHER ORGANIZATIONS

*What are other natural resource organizations doing?*

## **EPA Releases 2012 National Water Program Climate Change Strategy**

EPA has released the "National Water Program 2012 Strategy: Response to Climate Change," which describes how EPA's water-related programs plan to address the impacts of climate change and provides long-term visions, goals and strategic actions for the management of sustainable water resources for future generations. The strategy, which builds upon EPA's first climate change and water strategy released in 2008, focuses on five key areas: infrastructure, watersheds and wetlands, coastal and ocean waters, water quality, and working with Tribes. To learn more and to read the strategy, visit: <http://water.epa.gov/scitech/climatechange/2012-National-Water-Program-Strategy.cfm>.

## **USFWS Climate Change Response**

How do partnership efforts such as Landscape Conservation Cooperatives and the National Fish, Wildlife, and Plants Climate Adaptation Strategy fit into the Service's overall response to accelerating climate change? How is the agency reducing its carbon footprint? What is the agency doing now to reduce the impacts of climate change on fish, wildlife and plants? [Learn more](#)

## **USFWS Climate Change Information Toolkit.**

A key part of the Service's climate change strategy is to inform staff about the impacts of accelerating climate change and to engage partners and others in seeking collaborative solutions. Through shared knowledge and communication, we can work together to reduce the impacts of climate change on fish, wildlife, plants and their habitats. Here are some [resources](#) that can help.

**Washington's Blue Ribbon Panel on Ocean Acidification releases report -- see story below under the POLICY AND MANAGEMENT TAB**

## **LEARNING OPPORTUNITIES**

*Workshops, webinars, presentations*

### **December 17<sup>th</sup>, 12:00-1:00, Training Webinar on Assessing Climate Change Impacts on Water Resources**

This webinar will introduce a pilot training program on assessing climate change impacts on water resources. The Climate Change and Water Working Group agencies (Bureau of Reclamation, U.S. Army Corps of Engineers, NOAA, EPA, and U.S. Geological Survey) in cooperation with the University Corporation for Atmospheric Research COMET Program and the Western Water Assessment have developed this pilot training program. The pilot program includes both an online module for self-paced training (see subsequent item in e-newsletter) and a set of subsequent residence courses building on the online training, which focus on assessing impacts on surface water hydrology and crop irrigation requirements. This webinar will cover high-level objectives, the prerequisite online training, the registration process, and the supporting materials and resources for the following two training courses: "Hydrologic Impacts under Climate Change" (January 15-17, 2013), and "Crop Irrigation Requirements Impacts under Climate Change" (March 5-7, 2013). To register for this webinar, please visit: <https://www1.gotomeeting.com/register/417576272>.

### **January 3<sup>rd</sup>, 12-1:00, NRB 172 (note room change from earlier email)-- "Climate Variability of the Pacific Northwest", featuring Nick Bond, Washington State**

**Climatologist.** Please email Lynn for webex information, or see the email sent 12/13/12. Nick's talk will provide an overview of climate in Washington, highlighting the underlying drivers and patterns of

variability in our climate, as well as observed trends and predictability. He will also talk about the use of climate model projections for the region, and tools for acquiring and processing climate data from the Office of the Washington State Climatologist.

**“CHASING ICE”, a stunning documentary that shows time-lapse images of glacial retreat** - compilations of hourly shots taken over years that illustrate glaciers ebbing and flowing, shrinking and flattening over time. A former skeptic about climate change, *National Geographic* photographer **James Balog** began to illustrate what could be the biggest story in human history when he started the **Extreme Ice Survey**. Balog deployed revolutionary time-lapse cameras across the Arctic to capture a multi-year record of the world's changing glaciers. His hauntingly beautiful videos compress years into seconds and capture mountains of ice in motion as they disappear at a breathtaking rate. Here's the trailer: <http://www.chasingice.com/>  
*Check your local listings for showtimes near you. For those in the Olympia area, it is scheduled at the Olympia Film Society for late January.*

**February 1<sup>st</sup>, 12-1:00, NRB 175 A/B, Bill Geer, Climate Change Initiative Manager with the Theodore Roosevelt Conservation Partnership, “Educating Sportsmen about Climate Change”**  
- WEBEX information to be sent later!

Over the past year, Bill Geer has been visiting with sportsmen's clubs across the west, sharing a short video about climate change and talking with club members about climate change and potential impacts on hunting and fishing opportunities. In this presentation, Bill will share his observations about these conversations and the reactions from the dozens of clubs he has visited over the last many months, including many in Washington. He will highlight which messages seem to resonate and where challenges arise. We will spend the last 20 minutes of the hour watching the presentation prepared specifically for Washington.

## RESOURCES

### [National Climate Change Indicators](#)

EPA has released a set of 26 [indicators](#) tracking signs of climate change. Most of these indicators focus on the United States, but some include global trends to provide context or a basis for comparison. EPA's indicators are based on peer-reviewed data from various government agencies, academic institutions, and other organizations. Use this site to learn more about EPA's indicators related to [greenhouse gases](#), [weather and climate](#), [oceans, snow and ice](#), and [society and ecosystems](#). A slide show on the home page provides a nice introduction to the indicators. EPA is working with the National Climate Assessment (see below) to coordinate key indicators.

### **Climate Aquatics Blog (Dan Isaak, USFS et al)**

The intent of the [Climate-Aquatics Blog](#) is to provide a means for the field biologists, hydrologists, students, managers, and researchers to more broadly and rapidly discuss topical issues associated with aquatic ecosystems and climate change. Messages periodically posted to this blog will highlight peer-reviewed research and science tools that may be useful in addressing this global phenomenon. Recent posts (please visit the website for access to the full list of posts)

Blog #30: [Recording and mapping Earth's stream biodiversity from genetic samples of critters](#)

Blog #31: [Global trends in species shifts caused by climate change](#)

Blog #32: [Empirical evidence of fish phenology shifts related to climate change](#)

## CLIMATE SCIENCE NEWS

### [Plants and Soils Could Accelerate Climate's Warming, Study Warns](#)

***As the climate warms, plants and soils may not absorb more carbon as scientists once thought.***

When climate scientists try to estimate how much the Earth will warm due to increasing levels of greenhouse gases in the atmosphere, a key consideration is the role of plants and soils. The more carbon they absorb, the more they reduce the global warming potential. But recent studies indicate that assumptions about plants' and soils' capacity in the so-called "carbon cycle" may be overly optimistic. If these studies are correct, even bigger cuts in greenhouse gas emissions will be needed to prevent drastic, irreparable climate shifts. Not only is it possible that plants won't be able to absorb as much carbon as climate models currently project, but plants' response to the carbon cycle could actually amplify global warming, Paul Higgins and John Harte write in [the November edition of the Journal of Climate](#). It all comes down to mobility. Carbon dioxide is recognized as critical for photosynthesis, so the more there is in the atmosphere, the more there is available for plant growth. As Earth's climate warms, the theory has been that trees and other plant communities would treat the added CO<sub>2</sub> as fertilizer and grow bigger and faster. But because climate conditions will be changing, to take advantage of the added CO<sub>2</sub> some plant communities will have to migrate to neighboring areas that provide the necessary growing conditions. The speed at which plants can make these moves is the question.

Here's the new national-level synthesis document from the **National Climate Assessment**. (Note: The hyperlink opens a 2.4MB pdf file.)

[Coastal Impacts, Adaptation, and Vulnerabilities: 2012 Technical Input Report to the 2013 National Climate Assessment](#). This report, one of a series of technical inputs for the third NCA conducted under the auspices of the U.S. Global Change Research Program, examines the known effects and relationships of climate change variables on the coasts of the U.S. It describes the impacts on natural and human systems, including several major sectors of the U.S. economy, and the progress and challenges to planning and implementing adaptation options. Impacts on coastal systems are among the most costly and most certain consequences of a warming climate (Nicholls et al., 2007). The warming atmosphere is expected to accelerate sea-level rise as a result of the decline of glaciers and ice sheets and the thermal expansion of sea water. As mean sea level rises, coastal shorelines will retreat and low-lying areas will tend to be inundated more frequently, if not permanently, by the advancing sea. As atmospheric temperature increases and rainfall patterns change, soil moisture and runoff to the coast are likely to be altered. An increase in the intensity of climatic extremes such as storms and heat spells, coupled with other impacts of climate change and the effects of human development, could affect the sustainability of many existing coastal communities and natural resources.

## SPECIES AND HABITATS

### [Ecological Effects of Climate Change on Salt Marsh Wildlife: A Case Study from a Highly Urbanized Estuary](#)

*Karen M. Thorne, John Y. Takekawa, and Deborah L. Elliott-Fisk*

Coastal areas are high-risk zones subject to the impacts of global climate change, with significant increases in the frequencies of extreme weather and storm events, and sea-level rise forecast by 2100. Synergistic effects caused by combining stressors with anthropogenic land-use patterns could create areas of significant biodiversity loss and extinction, especially in urbanized estuaries that are already heavily degraded. This paper discusses current ideas, challenges, and concerns regarding the maintenance of salt marshes and their resident wildlife in light of future climate conditions. Major points are illustrated with a case study on the Pacific Coast of North America at San Pablo Bay National Wildlife Refuge in California, an area that supports endangered wildlife species reliant on salt marshes for all aspects of their life histories.

### **Adapting to Climate Change on Western Public Lands: Addressing the Ecological Effects of Domestic, Wild, and Feral Ungulates**

*Robert L. Beschta, Debra L. Donahue, Dominick A. DellaSala, Jonathan J. Rhodes, James R. Karr, Mary H. O'Brien, Thomas L. Fleischner, Cindy Deacon Williams*

(From Gary Wiles), [attached](#) is a new review paper on management of impacts from livestock and large wild ungulate populations on western public lands as it relates to climate change. This is the one that the livestock industry has been attacking in the press over the last week or two. Gary notes that Figure 1 shows how few federal grazing allotments occur in Washington compared to other western states.

### [A Risk-Based Approach to Evaluating Wildlife Demographics for Management in a Changing Climate: A Case Study of the Lewis's Woodpecker.](#)

*Towler et al.* This study examines the current and potential impact of climate on nest survival of the Lewis's Woodpecker in two different habitats. This study provides a concrete example of how to use a risk-based approach to inform species and habitat management. Furthermore, this is the only study to date that explores the impact of climate change on the Lewis's Woodpecker. Environmental Management DOI 10.1007/s00267-012-9953-z

### [Competing Forces Within a Century of Climate Change Produce Complex Avian Elevation Shifts](#)

*Tingley et al.* Responses to climate change (both temperature and precipitation) are specific to species and region. Many species are predicted to respond to changes in climate by shifting their distributions polewards or upwards to maintain favorable climate conditions. However, recent work by Tingley et al. (2012) shows surprising variety of response: while some bird species move upslope to maintain the same temperature regime, others move downslope to maintain the same precipitation regime, if precipitation increases in a mountain area. (2012) The push and pull of climate change causes heterogeneous shifts in avian elevational ranges,

Global Change Biology Volume 18, Issue 11, pages 3279–3290, doi: 10.1111/j.1365-2486.2012.02784.x

[Vegetation's importance in regulating surface elevation in a coastal salt marsh facing elevated rates of sea level rise](#): This study highlights the importance of vegetation in the accretionary processes that maintain marsh surface elevation within the intertidal zone, and provide evidence that coastal wetlands may be able to keep pace with a rising sea in certain situations. *Baustian et al.*, Global Change Biology [Volume 18, Issue 11](#), pages 3377–3382, November 2012 DOI: 10.1111/j.1365-2486.2012.02792.x

## POLICY AND MANAGEMENT - MITIGATION AND ADAPTATION

### [Ocean Acidification: From Knowledge to Action](#) – Washington’s Blue Ribbon Panel on Ocean Acidification releases report and recommendations.

The panel of experts and stakeholders appointed 10 months ago by Gov. Chris Gregoire released its [report](#) in late November. The first of its kind at such a high level of state governance, the report includes 42 wide-ranging recommendations. Those include specifics such as increasing seaweed farming to remove carbon dioxide from ocean waters, and generalities such as reducing greenhouse gas emissions. In response to the report, Governor Gregoire issued an [executive order](#) on November 27<sup>th</sup>, directing the Department of Ecology and other state agencies to:

- Advocate for reductions in emissions of carbon dioxide at global, national and regional levels;
- Implement the recommendations of the Blue Ribbon Panel, working with key federal agencies and tribal governments;
- Work with the University of Washington and others to conduct technical analysis on the effects of ocean acidification, on the sources of local land-based sources of nutrients that may contribute to ocean acidification, and on appropriate steps to address the problem;
- Request that the U.S. Environmental Protection Agency begin the assessment of water quality criteria relevant to ocean acidification; and,
- Increase understanding of ocean acidification and its consequences among policymakers, interested organizations and the public.

In her budget to be released in December, Gov. Gregoire will reallocate \$3.3 million to fund priority actions on ocean acidification. Her budget will include funding to help shellfish hatcheries make short-term forecasts and adapt to increasingly acidic water conditions. She will also propose a new center for ocean acidification at the University of Washington to investigate impacts on native species and begin to reduce local water pollution increasing acidification. The funds would come from existing taxes collected on hazardous substances and revenue from leases on state-owned aquatic lands, including the sale of geoduck clams.

### **Climate change damages winter tourism** ([from the Seattle times](#))

[A new report](#) from the nonprofit groups **Protect Our Winters** and the **Natural Resources Defense Council** indicates the the \$12 billion winter tourism industry sector has lost \$1 billion and up to 27,000 jobs in 38 states over the last decade because of diminished snow fall. In Washington, where more than 6,000 jobs are supported by winter tourism, the change in estimated number of skier visits between high and low snowfall years from November 1999 and April 2010 was down 28 percent. Oregon, with 5,565 jobs, saw a decline of 31 percent. Colorado, with 37,838 jobs, dropped nearly 8 percent.

Nationally, an estimated 23 million people participated in winter sports in 2009-2010, generating \$1.4 billion in state and local taxes and \$1.7 billion in federal taxes.

New poll shows 4 out of 5 think global warming will be a serious problem.

Nearly 4 out of 5 Americans now think temperatures are rising and that global warming will be a serious problem for the United States if nothing is done about it, [a new Associated Press-GfK poll](#) finds. Belief and worry about climate change are inching up among Americans in general, but concern is growing faster among people who don't often trust scientists on the environment. In follow-up interviews, some of those doubters said they believe their own eyes as they've watched thermometers rise, New York City subway tunnels flood, polar ice melt and Midwestern farm fields dry up. Overall, 78 percent of those surveyed said they thought temperatures were rising and 80 percent called it a serious problem. That's up slightly from 2009, when 75 percent thought global warming was occurring and just 73 percent thought it was a serious problem.