

Greetings and welcome to the **April 2014** edition of the WDFW Climate News Digest. Our purpose 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> and on the agency's [climate change web page](#).

Thanks for contributions this month from Teresa Scott, Bill Tweit, Doug Wiedemeier, Bob Vadas and Marc Hayes.

WHAT'S HAPPENING AT WDFW?

Are you thinking about the climate change implications on a project you are involved with or actively working to address them? Do you know of a WDFW initiative where we *should* be thinking about future climate change? Have you come across climate change research which feels particularly relevant to the work you do? Please be in touch if you think you have something to share that might be of interest to your colleagues!

CLIMATE ADAPTATION AT OTHER ORGANIZATIONS

DNR hires an Executive Policy Advisor for Climate Adaptation and Energy

Dan Siemann was recently hired to fill this post, previously held by Rachel Jamison. Dan brings a good deal of expertise and experience in climate and energy issues, having recently worked with the National Wildlife Federation as their Environmental Policy Specialist for the Pacific Region. WDFW staff may recall that Dan worked with the agency for several years as part of a NWF Duke Grant to integrate climate change into wildlife planning. Dan's new contact information is Dan.Siemann@dnr.wa.gov or (360) 902-1104.

Federal Highway Administration Announces Climate Adaptation Case Studies (including WSDOT)

The Federal Highway Administration is partnering with State Departments of Transportation, Metropolitan Planning Organizations, and Federal Land Management Agencies to pilot approaches to conduct climate change and extreme weather vulnerability assessments of transportation infrastructure and to analyze options for adapting and improving resiliency. For more information and to view these case studies, visit: http://www.fhwa.dot.gov/environment/climate_change/adaptation/ongoing_and_current_research/vulnerability_assessment_pilots/index.cfm.

GSA Develops Annotated Version of Executive Order 13653 on Preparing the U.S. for the Impacts of Climate Change

Want some help understanding Executive Order 13653, "Preparing the United States for the Impacts of Climate Change"? Want to know how to increase resiliency and prepare for a changing environment? The Sustainable Facilities Tool can walk you through an annotated version of the Executive Order and provide information on definitions, strategies, and links along the way. Clickable terms appear as you explore the Executive Order with the tool and links to external resources, definitions, and strategies and best practices are provided. To learn more, visit: <http://sftool.gov/learn/annotation/427/executive-order-13653-preparing-united-states-impacts-climate-change>.

Bureau of Indian Affairs Announces Funding Opportunity to Address Challenges of Climate Change

The Bureau of Indian Affairs (BIA) has announced a request for proposals to support Tribes in adapting to the challenges of climate change in tribal communities, especially with respect to ocean and coastal management planning. The competitive grants are for tribal adaptation, training, and travel support (to participate in technical workshops, forums, and cooperative efforts). For information on your BIA regional office climate change contact and for information on the grant application process, visit:

<http://www.bia.gov/cs/groups/public/documents/text/idc1-025664.pdf>.

LEARNING OPPORTUNITIES

Thursday, April 3 at 11:00 PM PST, Webinar: "Integrated Scenarios of the Future Northwest Environment", featuring Phillip Mote.

Register at <https://nccwsc.usgs.gov/webinar/310>

Funded in part by the Northwest Climate Science Center, this project integrates, for the first time, state-of-the-science predictive modeling of different attributes of the future environment in the Northwest. This project has evaluated and downscaled global climate models (from the Coupled Model Intercomparison Project phase 5, CMIP5), examined projections from these models and also from regional climate models, and improved and applied hydrologic and vegetation models. This webinar is a preview of a day-long workshop on project results that will be held April 17 in Portland, and webcast (see below).

[Portland Workshop on the Future Northwest Environment](#)

A workshop in Portland April 17 will present the results of a new project in which researchers used state-of-the-science climate, hydrology, and vegetation models to describe how the northwest's environment will change during the 21st century. Registration is free and the workshop will also be webcast. The research and the workshop are sponsored by the Climate Impacts Research Consortium and by the NW Climate Science Center. Click [here](#) for registration information.

Thursday, April 24 (4:30-7:30), a community open house entitled Skagit County Flood Risk in a Changing Climate,

sponsored by the [Skagit Climate Science Consortium \(SC2\)](#) - a group of research scientists from universities and federal, municipal, and tribal governments and agencies working in the Skagit Basin. SC2 seeks to understand how the landscape, plants, animals and people may be affected by changes in the patterns of rain, snow, temperature, storms and tides. **LOCATION:** Best Western Plus Skagit Valley Inn (formerly known as The Cotton Tree), 2300 Market Street, Mt. Vernon, WA 98273. To ensure adequate space and refreshments, please RSVP to cmacilroy@gmail.com by April 10. Save the date flyer attached.

Wednesday, May 28th, 9:00 am to 4:00 pm, "Urban Forest Symposium: Climate Change and the Urban Forest", hosted by Plant Amnesty and the University of Washington Botanic Gardens at Center for Urban Horticulture, 3501 NE 41st St, Seattle, WA 98105

Register: <http://depts.washington.edu/uwbg/news/urban-forest/>

This year's urban forest symposium takes an in-depth look at climate change and considers the impact to the urban forest. Learn about the climatic changes our region can expect and strategies that can be used to plan and manage for a healthy and resilient urban forest. Presenters will discuss the expected changes to the climate, urban forest responses, and what urban foresters and advocates can do to prepare.

Sept 9-10, 2014, Seattle, WA, Fifth Annual Pacific Northwest Climate Science Conference,
<http://pnwclimateconference.org/>

The PNW Climate Science Conference annually brings together more than 250 researchers and practitioners from around the region to discuss scientific results, challenges, and solutions related to the impacts of climate on people, natural resources, and infrastructure in the Pacific Northwest. Emphasis is on talks that are comprehensible to a wide audience on topics of broad interest. Stay tuned for further details regarding abstract submission, registration, and program news. In the meantime, please contact Lara Whitely Binder (lwb123@uw.edu) with any questions about the conference.

RESOURCES

[The West Coast Science Panel on Ocean Acidification and Hypoxia](#)

In marine science, no issue is currently receiving more attention than ocean acidification (OA), a progressive increase in the acidity of the ocean over an extended period. In summer 2013, Governor Kitzhaber's office formally aligned Oregon with California efforts to implement the West Coast Ocean Acidification and Hypoxia (OAH) Science Panel. The Institute for Natural Resources (INR) is working with the California Ocean Science Trust (CalOST) to convene experts from Oregon, California, and Washington. [Read more](#)

Spring 2014 PNW Seasonal Outlook and Recap (from Climate Impacts Research Consortium)

Please find the Spring 2014 PNW Seasonal Outlook and Recap attached. This issue focuses on the drought conditions experienced since the beginning of the water year with discussion of the seasonal forecast.

Obama Administration Launches Climate Data Initiative

Delivering on a commitment in the President's Climate Action Plan, released in June 2013, the Obama Administration has launched the Climate Data Initiative - a broad effort to leverage the federal government's extensive, freely-available climate-relevant data resources to stimulate innovation and private-sector entrepreneurship in support of national climate-change preparedness. Initially, in this pilot phase, data and resources related to coastal flooding, sea level rise, and their impacts can be found. Over time, one will be able to find additional data and tools relevant to other important climate-related impacts, including risks to human health, the food supply, and energy infrastructure. To view the fact sheet, visit: <http://www.whitehouse.gov/the-press-office/2014/03/19/fact-sheet-president-s-climate-data-initiative-empowering-america-s-comm>. To learn more, visit: <http://www.data.gov/climate/>.

NOAA Fisheries announces completion of the Fish Stock Climate Vulnerability Assessment methodology

This is the first methodology of its kind to rapidly assess of the vulnerability of U.S. marine fish stocks to changing climate and ocean conditions. This methodology will provide fisheries managers and scientists with information about the relative vulnerability of fish species to projected future climate-ocean conditions which will help inform future science needs and management strategies. NOAA Fisheries will use the methodology to assess the vulnerability of 80 marine fish stocks of the Northeast marine ecosystem and the methodology is designed to be replicated in other regions depending on needs and available resources. The development of this methodology is also part of NOAA Fisheries' implementation of the National Fish Wildlife and Plant Climate Adaptation Strategy, the President's Climate Action Plan, and the National Ocean Policy. You can see more information at: <http://www.st.nmfs.noaa.gov/ecosystems/climate/activities/assessing-vulnerability-of-fish-stocks>.

East Coast Climate Change and Fisheries Governance Workshop

(from Bill Tweit)

At this workshop Bill learned that the Mid Atlantic Council had sponsored a February workshop on the impacts of climate change on marine fishery management, with some useful presentations. Those presentations [are on the web](#). Bill recommends the Jon Hare and Malin Pinsky presentations in particular, although all are worthwhile. The presentations at the East Coast Climate Change and Fisheries Governance workshop are also [on the web](#).

Several of them delved into the socioeconomic aspects of the effects of the rapid changes in fishery distribution and abundance; all are worth reviewing.

AAAS Communication Campaign - What We Know: The Reality, Risks and Response to Climate Change

The American Association for the Advancement of Science (AAAS) has released a media-rich Web site and white paper to share key messages for every American about climate change. The AAAS is the world's largest non-government general science membership organization. Regarding the *What We Know* Initiative, the site states "Understanding science is our work. Our consensus is that climate change is happening and the risks are real."

[Visit the site »](#)

[Download the paper »](#)

Climate Inspector

Explore climate anomalies, variability and uncertainty in space and time with the Climate Inspector. This map based visualization is supported by The National Center for Atmospheric Research. [Click here](#) to learn more.

CLIMATE SCIENCE NEWS

How Rain Affects Snowpack

What happens when rain, and particularly heavy rain, falls upon a mountain snow pack? Does it rapidly melt the snow? Contribute to flooding? Or what?

It turns out that the answer to this question is quite important, with implications for what will happen to our area rivers under global warming.

<http://cliffmass.blogspot.com/2014/03/snow-sponge.html>

NOAA Releases 2013 Global Climate Report

The average global temperature for 2013 tied as the fourth warmest year since record keeping began in 1880, according to NOAA scientists. It also marked the 37th consecutive year with a global temperature above the 20th century average. The last below-average annual temperature was 1976. Including 2013, all 13 years of the 21st century (2001-2013) rank among the 15 warmest in the 134-year period of record. The three warmest years on record are 1998, 2005, and 2010. This analysis is from NOAA's National Climatic Data Center in Asheville, North Carolina. To access the summary and full report, visit:

<http://www.ncdc.noaa.gov/news/ncdc-releases-2013-global-climate-report>.

Global Warming Slows Down Antarctica's Coldest Currents

(from Scientific American) The deep, salty currents that carry oxygen and nutrients to the ocean depths have been disappearing over the past few decades

A shift from briny to fresh in Antarctica's ocean waters in recent decades could explain the shutdown of the Southern Ocean's coldest, deepest currents, a new study finds. The cold currents, called the Antarctic

Bottom Water, are chilly, salty rivers that flow from the underwater edge of the [Antarctic](#) continent north toward the equator, keeping to the bottom of the seafloor. The currents carry oxygen, carbon and nutrients down to the deepest parts of the ocean. Previous studies have found [this deep, dense water is disappearing](#), though researchers aren't sure if the shrinkage is part of a long-term trend linked to global warming, or a natural cycle. The new study suggests that Antarctica's changing climate is to blame for the shrinking Antarctica Bottom Water

A more potent greenhouse gas than carbon dioxide, methane emissions will leap as Earth warms

(from Science Daily) While carbon dioxide is typically painted as the bad boy of greenhouse gases, methane is roughly 30 times more potent as a heat-trapping gas. New research in the journal *Nature* indicates that for each degree that Earth's temperature rises, the amount of methane entering the atmosphere from microorganisms dwelling in lake sediment and freshwater wetlands -- the primary sources of the gas -- will increase several times. As temperatures rise, the relative increase of methane emissions will outpace that of carbon dioxide from these sources, the researchers report. The findings condense the complex and varied process by which methane -- currently the third most prevalent greenhouse gas after carbon dioxide and water vapor -- enters the atmosphere into a measurement scientists can use. [full story](#)
Gabriel Yvon-Durocher et al. Methane fluxes show consistent temperature dependence across microbial to ecosystem scales. *Nature*, 2014; 507 (7493): 488 DOI: [10.1038/nature13164](https://doi.org/10.1038/nature13164)

SPECIES AND HABITATS

Wildflower Season in Rockies is 35 Days Longer as Climate Warms

A warming climate has extended the wildflower season in the Rocky Mountains by 35 days since late 1970s, according to a 39-year study of more than two million blooms. The bloom season, which used to run from late May to early September, now lasts from late April to late September, the researchers say. Previous, less extensive studies seemed to indicate most wildflowers simply shift their bloom cycles to earlier in the year, but new findings published in the *Proceedings of the National Academy of Sciences* show that the changes are more complex, with the flowers reaching peak bloom sooner and flowering later in the year. The shift in the timing of blooms could have major impact on pollinating insects and migratory birds. For example, hummingbirds that summer in the Rocky Mountains time their nesting so that their eggs hatch at peak bloom, when there is plenty of flower nectar for hungry chicks. But as the bloom season lengthens, the plants are not producing more flowers. The same number of blooms is spread out over more days so at peak bloom there may be fewer flowers and less food for hummingbirds.

Assessing the Impacts of Climate Change on Bull Trout in Oregon

Bull trout are an endangered species in the Pacific Northwest and their populations may be particularly susceptible to the impacts of a warming climate. Bull trout are thought to avoid warmer water temperatures but little is known about their thermal habitat requirements in streams and lakes. To better assess the impacts climate change may pose to bull trout, USGS scientists tagged and tracked 42 trout in the Lostine River, Oregon to monitor their thermal tolerances. Results indicated that the Lostine River bull trout population did not preferentially avoid warmer waters. These results could be best explained by the fact that Lostine River is located at a more southerly latitude, thus the bull trout population in this river has acclimated to warmer than expected temperatures for centuries. Similar studies to the Lostine River are being conducted in other bull trout habitat in Oregon, Washington, Idaho, Nevada, and Montana. [Read more.](#)

A Quantitative Metric to Identify Critical Elements within Seafood Supply Networks

(from the abstract – article attached) A theoretical basis is required for comparing key features and critical elements in wild fisheries and aquaculture

supply chains under a changing climate. In this article we develop a new quantitative metric that is analogous to indices used to analyse food-webs and identify key species. The Supply Chain Index (SCI) identifies critical elements as those with large throughput rates, as well as greater connectivity. The sum of the scores for a supply chain provides a single metric that roughly captures both the resilience and connectedness of a supply chain. Standardised scores can facilitate cross comparisons both under current conditions as well as under a changing climate.

Citation: Plaga'nyi E' E, van Putten I, The'baud O, Hobday AJ, I

Warming temperatures are pushing two chickadee species -- and their hybrids -- northward

(Science Daily) The two chickadee species overlap in a narrow band across the eastern United States. This band has moved northward by 7 miles in the last decade. The zone of overlap between two popular, closely related backyard birds is moving northward at a rate that matches warming winter temperatures, according to a study by researchers from the Cornell Lab of Ornithology, Villanova University, and Cornell University. In a narrow strip that runs across the eastern U.S., Carolina Chickadees from the south meet and interbreed with Black-capped Chickadees from the north. The new study finds that this hybrid zone has moved northward at a rate of 0.7 mile per year over the last decade. That's fast enough that the researchers had to add an extra study site partway through their project in order to keep up. "A lot of the time climate change doesn't really seem tangible," said lead author Scott Taylor, a postdoctoral researcher at the Cornell Lab of Ornithology. "But here are these common little backyard birds we all grew up with, and we're seeing them moving northward on relatively short time scales." As a final step, the researchers overlaid temperature records on a map of the overlap zone, drawn from eBird sightings of the two chickadee species. They found a very close match: the zone of overlap occurred only in areas where the average winter low temperature was between 14 and 20 degrees Fahrenheit.

Scott A. Taylor, Thomas A. White, Wesley M. Hochachka, Valentina Ferretti, Robert L. Curry, Irby Lovette.

Climate-Mediated Movement of an Avian Hybrid Zone. Current Biology, March 2014 DOI:

[10.1016/j.cub.2014.01.069](https://doi.org/10.1016/j.cub.2014.01.069)

Salamanders shrinking as their mountain havens heat up

(from Science Daily) Salamanders in some of North America's best habitat are shrinking fast as their surroundings get warmer and drier, forcing them to burn more energy. A new article examines specimens caught in the Appalachian Mountains from 1957 to 2007 and wild salamanders caught at the same sites in 2011-2012. Animals measured after 1980 averaged 8 percent smaller -- one of the fastest rates of changing body size ever recorded. *(full story)*

Nicholas M. Caruso, Michael W. Sears, Dean C. Adams, Karen R. Lips. *Widespread rapid reductions in body size of adult salamanders in response to climate change. Global Change Biology, 2014; DOI:*

[10.1111/qcb.12550](https://doi.org/10.1111/qcb.12550)

POLICY AND MANAGEMENT - MITIGATION AND ADAPTATION

Responding to the effects of climate change

This report presents the findings from a national climate-change adaptation survey conducted by eight Sea Grant programs across the U.S. (Connecticut, Hawaii, Illinois-Indiana, Louisiana, Maryland, Minnesota, Oregon, and Washington). The survey was developed to understand the opinions, current phase of planning, and information needs of coastal/resource professionals and elected officials regarding climate change and adaptation to it.

Results from the survey indicate that most coastal/resource professionals seem to believe climate change is occurring in their area. Flooding and shoreline change are important topics to most of the participant

programs, and lack of agreement over climate-change effects is a hurdle encountered by many participants. Participating programs are using the survey results to assist communities with adaptation.

Preparing Now for Our Climate Future

Click [here](#) for a blog from Dr. Holdren, Lisa Monaco, and Mike Boots on the climate resilience components of President Obama's budget.

"Preparing for the impacts of climate change will be a fundamental challenge over the coming decades for every community, economic sector, and level of government in America. Through his Climate Action Plan and his Budget Request for Fiscal Year 2015, President Obama has committed to making national climate preparedness a reality."

Michael Boots is Acting Chair of the Council on Environmental Quality;

Dr. John P. Holdren is Assistant to the President for Science and Technology and Director of the Office of Science & Technology Policy; and

Lisa Monaco is Assistant to the President for Homeland Security and Counterterrorism and Deputy National Security Advisor

China and the United States, the world's top emitters of greenhouse gases, pledged on Feb 15 to work together to attenuate the effects of global climate change

[US-China Joint Statement on Climate Change](#): "In light of the overwhelming scientific consensus on climate change and its worsening impacts, and the related issue of air pollution from burning fossil fuels, the United States and China recognize the urgent need for action to meet these twin challenges. Both sides reaffirm their commitment to contribute significantly to successful 2015 global efforts to meet this challenge. Accordingly, China and the United States will work together, within the vehicle of the U.S.-China Climate Change Working Group (CCWG) launched last year, to collaborate through enhanced policy dialogue, including the sharing of information regarding their respective post-2020 plans to limit greenhouse gas emissions.

National policies advance as climate summit approaches

Analysis suggests country-level commitments are a bridge to an international treaty. Nearly 500 climate-related laws have been enacted in 66 countries that together are responsible for nearly 90% of the world's heat-trapping emissions, according to an international survey of climate legislation released by the London-based Global Legislators Organisation (GLOBE) and the Grantham Institute at the London School of Economics. The United Nations will hold a climate summit in New York in September in preparation for the next set of climate negotiations three months later in Lima, Peru. In the first quarter of 2015, countries are expected to submit their commitments for the talks later that year in Paris. [*Jeff Tollefson, Nature, Feb 27, 2014, oi:10.1038/nature.2014.14786*]

Russian farming collapse and ecological benefits

The collapse of collective farming in Russia after 1990 and the subsequent economic crisis led to the abandonment of more than 45 million ha of arable lands (23% of the agricultural area). The withdrawal of land area from cultivation led to several ecological benefits including carbon (C) sequestration in soil. Researchers demonstrate C sequestered in these abandoned lands compensate all fire and post-fire CO₂ emissions in Russia and covers about 4% of the global CO₂ release due to deforestation and other land use changes. [*Kurganova, I., Lopes de Gerenyu, V., Six, J. and Kuzyakov, Y. (2014), Carbon cost of collective farming collapse in Russia. Global Change Biology, 20: 938–947. doi: 10.1111/gcb.12379*]

