

Greetings and welcome to the **AUGUST 2013** edition of the WDFW Climate News Digest (the Climate Digest was on vacation in July!) 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>.

*\* Special thanks to David Patte (USFWS) and Ellie Cohen (Point Blue Conservation Science) for several contributions to this month's edition from their newsletters.*

## WHAT'S HAPPENING AT WDFW?

### **WDFW sponsors brown bag lunch talk -- “Considerations In Using Downscaled Climate Models For Resource Management”**

**August 14th -- 12:00 – 1:00; Room 172, Natural Resources Building**

WDFW is sponsoring a brown bag presentation with Dr. Meade Krosby and Dr. Guillaume Mauger from the Climate Impacts Group at the University of Washington. Meade and Guillaume will review findings from a [recent report](#) exploring the pros and cons of using downscaled climate models for resource management, particularly in regards to connectivity conservation planning. The talk will highlight topics such as the various types of downscaling, how to deal with uncertainty, and the value added of downscaled climate data relative to alternative climate models for the purposes of identifying climate resilient landscapes. A practical application will also be presented - an evaluation of the utility of climate models in an ongoing assessment of habitat connectivity in the Washington-British Columbia transboundary region.

### **Lands 20/20 application (for habitat acquisition proposals) now includes climate change criteria**

The recently released Lands 20/20 Application has been updated to include climate change criteria and includes a climate change appendix with guidance and resources for addressing the criteria. Project proponents are being asked to describe generally how climate change trends might affect the key habitat features of their site, and also how the site may contribute to increasing the overall resilience of the site or region to the impacts of climate change. More information about the application process and copies of the climate change appendix can be found at the Sharepoint site: <http://sharepoint.dis.wa.gov/dfw/wildlife/lands/res/default.aspx>, or contact [Lauri Vigue](#) or [Lynn Helbrecht](#) for additional information.

## CLIMATE ADAPTATION AT OTHER ORGANIZATIONS

**The North Coast and Cascades Science Learning Network** encourages research in Northwest national parks and disseminates the results of that research. The Network has just released a [new video on glacier monitoring at North Cascades and Mount Rainier national park](#), featuring lead glaciologist, Dr. Jon Riedel, showing what he does and explaining why he does it.

### **NOAA Offers Climate Connection E-Newsletter**

NOAA Climate Connection is a free monthly e-newsletter designed to increase climate literacy and communication capacity for NOAA and its partners.

Subscription requests can be sent to [NOAAClimateConnection@noaa.gov](mailto:NOAAClimateConnection@noaa.gov). To view the June 2013 NOAA Climate Connection e-newsletter, visit:

<http://myemail.constantcontact.com/June-2013Newsletter.html?soid=1108948661887&aid=Wq8eeBvJSGA>.

## **LEARNING OPPORTUNITIES**

### **August 29, 11:30a.m.-12:30p.m. (Pacific Time) Pikas in the Columbia River Gorge**

USFWS- C3 (Climate Change Collaborative) Webinar

[WebEx link](#) Call in: 877 952-8012 Access code: 274207

### **September 5-6, 2013, 4<sup>th</sup> Annual Pacific Northwest Climate Science Conference, Portland**

The 4th annual Pacific Northwest Climate Science Conference will be held in Portland 5-6 September 2013. The conference provides a forum for researchers and practitioners to convene and exchange scientific results, challenges, and solutions related to the impacts of climate on people, natural resources, and infrastructure in the Pacific Northwest. The conference attracts a wide range of participants including policy- and decision-makers, resource managers, and scientists, from public agencies, sovereign tribal nations, non-governmental organizations, and more. Registration and lodging information will be available soon. See <http://pnwclimateconference.org/>.

**September 10<sup>th</sup>, 10:00 AM Pacific time;** the second of a series of webinars on the WGA/LCC Riparian Mapping Project - an effort to develop high-resolution maps of potential riparian areas, their condition, and their climate adaptation potential, for the Pacific Northwest. Contact [Meade Krosby](#) to receive Webex information and a reminder shortly before the webinar.

### **Presentations available -- Inaugural National Climate Adaptation Forum**

The inaugural National Adaptation Forum was held in April, 2013, and included over 500 adaptation practitioners from around the country. PDF versions of presentations are now available on the Forum website. To view please [click here](#).

moving adaptation planning to adaptation action.. For more information on the forum please visit [www.nationaladaptationforum.org](http://www.nationaladaptationforum.org).

## **WEBINAR RECORDINGS**

[How will climate change affect bird distribution and abundance in the North Pacific?](#) Sam Veloz, Ph.D., and John Alexander, Ph.D.

Models of how the distribution and abundance of species will be affected by climate change can help managers develop appropriate management strategies. We will present our work demonstrating the value of integrating data collected by multiple partners into a central database and making these data

and associated modeling results available through a readily accessible decision support system. We will provide examples of how bird species distribution and abundance models representing current and future climate conditions within the southern portion of the North Pacific LCC, coupled with a coniferous forest bird conservation plan for this area, can be used to inform natural resource management planning efforts.

[Using soils to predict forest cover responses to climate change in the NPLCC](#), Wendy Peterman and Dr. Dominique Bachelet

Wendy Peterman is a soil scientist at Conservation Biology Institute, focusing on research to develop soil datasets to predict where forest cover is likely to change in response to changes in temperature and precipitation. In an upcoming article in *Ecohydrology* (Peterman et al., 2012), she shows how soil maps can be used to identify matching patterns in soil characteristics, water availability and tree mortality. She hopes to develop products that improve climate change impact models by furthering the predictability of future disturbance events such as insect outbreaks or fires.

[Can Camouflage Keep up with Climate Change? Connecting Downscaled Climate Models to Adaptation for a Key Forest Species](#)

Michael Mitchell and Scott Mills, University of Montana. This presentation features a research project to study a striking effect of climate change on wildlife, whereby seasonal coat color becomes mismatched with lack of snow. To date the study has quantified molt phenology, mismatch, behavioral plasticity, and fitness costs of mismatch for snowshoe hares over 3 years at two sites in Montana.

## RESOURCES

Point Blue Conservation Science (formerly PRBO Conservation Science) and the California State Coastal Conservancy have released a report entitled [Scenario Planning for Climate Change Adaptation](#)

[Tools for Assessing Climate Impacts on Fish and Wildlife](#)

This paper provides an overview of the types of models available for forecasting the effects of climate change on key processes that affect fish and wildlife habitat (hydrology, fire, and vegetation), as well as on individual species distributions and populations. Researchers present a framework for how climate-impacts modeling can be used to address management concerns, providing examples of model-based assessments of climate impacts on salmon populations in the Pacific Northwest, fire regimes in the boreal region of Canada, prairies and savannas in the Willamette Valley-Puget Sound Trough-Georgia Basin ecoregion, and marten populations in the northeastern United States and southeastern Canada. They also highlight some key limitations of these models, discuss how such limitations should be managed, and conclude with a general discussion of how these models can be integrated into fish and wildlife management.

**Bay Area Ecosystems Climate Change Consortium** has compiled several case studies on climate-smart restoration projects

[Redwood Creek Restoration at Muir Beach](#), National Park Service. This 46-acre landscape-level restoration at Muir Beach will restore fluvial and coastal processes at the mouth of the

watershed, and will enhance ecosystem adaptation to changing groundwater elevations, storm surges, tidal influences, and more intense flood events.

[Upper Pajaro River Floodplain Restoration](#), The Nature Conservancy. This project will restore riparian habitat along the upper Pajaro River in a manner that will address identified vulnerabilities to climate change, including maintaining migratory corridors for wildlife and the storing flood waters to protect downstream communities during storms. The summary includes valuable lessons learned during the conduct of the vulnerability analysis.

[Sears Point Restoration](#), Sonoma Land Trust. This project will restore/enhance 960 acres of tidal marsh and nearly 1,350 acres of associated ecotonal seasonal wetlands, riparian corridors, and upland grasslands at Sears Point. Specific design elements have been included to provide resilience against sea level rise.

[STRAW Climate Smart Stream Restoration](#), PRBO Conservation Science. This project is incorporating climate smart streamside restoration designs that can accommodate expected changes in temperature and precipitation (usually warmer and drier), changes in extreme events (i.e., more frequent drought and more intense precipitation events), and disrupted wildlife and plant phenology.

[Bruener Marsh Restoration](#), East Bay Regional Park District. This project will restore/enhance 60 acres of wetlands and 90 acres of coastal prairie designed to evolve naturally with climate change. The project is designed to accommodate a projected 55-inch rise in sea level by the year 2100, reusing fill already on site to establish upland transition zones where tidal wetlands can migrate as sea level rises.

[Shoreline Change San Pablo Bay Pilot Study: Understanding Spatial Patterns of Marsh Sensitivity and Resilience](#), San Francisco Estuary Institute. This project is an analysis of long- and short-term rates of tidal marsh erosion in San Pablo Bay, and is developing initial understandings of the physical processes driving these trajectories and the implications for management strategies to protect and restore the marsh shoreline.

## CLIMATE SCIENCE NEWS

### [Deciphering the air-sea communication: Ocean significantly affects long-term climate fluctuations](#)

Scientists have investigated the role of heat exchange between ocean and atmosphere in long-term climate variability in the Atlantic. The scientists analyzed meteorological measurements and sea surface temperatures over the past 130 years. It was found that the ocean significantly affects long term climate fluctuations, while the seemingly chaotic atmosphere is mainly responsible for the shorter-term, year-to-year changes.

### [Nighttime heat waves quadruple in Pacific Northwest](#)

Nighttime heat waves -- events where the nighttime low is unusually hot for at least three days in a row -- are becoming more common in western Washington and Oregon. It's well known that Pacific Northwest heat waves occur when breeze off the ocean is replaced with air flow from the east, which warms up as it flows down the western slope of the Cascade Mountains. The records show that nighttime heat waves happen during high humidity, where

water vapor in the air serves as a blanket to trap heat. Predictions are that climate change will bring longer, more extreme and more frequent heat waves during the day and night.

### **Present-Day Wave Heights Increase Risk for Coastal Communities**

A study published by CIRC researcher Peter Ruggiero found that increases in wave height (and period) have had a more significant role in the increased frequency of coastal flooding and erosion than sea level rise (SLR) in some stretches of the Pacific Northwest coastline. In particular, even areas where coastal uplift from tectonics is occurring more rapidly than sea level rise, increasing wave heights have still resulted in these stretches of coast being vulnerable to flooding. In other words, uplifting coastlines may outpace sea level rise but not increasing wave heights. Although there is some evidence suggesting that long-term wave heights may decrease (see Hemer et al. [2013] above), it is clear that this process remains at least as important as SLR in the near future and increases the exposure of coastal communities and ecosystems to flooding and erosion. Ruggiero, P. 2013. [Is the Intensifying Wave Climate of the U.S. Pacific Northwest Increasing Flooding and Erosion Risk Faster Than Sea-Level Rise?](#) American Society of Civil Engineers.

**NASA's [Carbon in Arctic Reservoirs Vulnerability Experiment \(CARVE\)](#)** aims to expand understanding of how the Arctic's water and carbon cycles are linked to climate, as well as what effects fires and thawing permafrost are having on Arctic carbon emissions. CARVE is testing hypotheses that Arctic carbon reservoirs are vulnerable to climate warming, while delivering the first direct measurements and detailed regional maps of Arctic carbon dioxide and methane sources and demonstrating new remote sensing and modeling capabilities. [Read the full article here.](#)

## **SPECIES AND HABITATS**

### **Changing Sea Surface Temperatures and Water Circulation Patterns Affecting Food Supply for Young Atlantic Cod**

Changing ocean water temperatures and circulation patterns have profoundly affected key Northeast U.S. Continental Shelf zooplankton species in recent decades, and may be influencing the recovery of Atlantic cod and other fish stocks in the region. NOAA researcher Kevin Friedland and colleagues looked at the distribution and abundance of important zooplankton species, sea surface water temperatures, and cod abundance. They found that zooplankton species critical for the survival of Atlantic cod larvae have declined in abundance in the same areas where Atlantic cod stocks have struggled to rebuild after an extended period of overfishing

### **Natural habitats such as dunes and reefs are critical to protecting property from coastal storms**

Extreme weather, sea level rise and degraded coastal systems are placing people and property at greater risk along the coast. Natural habitats such as dunes and reefs are critical to protecting millions of U.S. residents and billions of dollars in property from coastal storms, according to a new study by scientists with the Natural Capital Project at the Stanford Woods

Institute for the Environment. The study, "Coastal habitats shield people and property from sea-level rise and storms," published July 14 in the journal *Nature Climate Change*, offers the first comprehensive map of the entire U.S. coastline that shows where and how much protection communities get from natural habitats such as sand dunes, coral reefs, sea grasses and mangroves. The likelihood and magnitude of losses can be reduced by intact ecosystems near vulnerable coastal communities.

### **Birds Outpace Climate Change to Avoid Extinction**

A new study has shed light on the potential of birds to survive in the face of climate change. In the analysis, based on more than fifty years' detailed study of a population of great tits near Oxford, UK, a team of scientists were able to make predictions about how the birds could cope with a changing climate in the future. They found that for small, short-lived birds like the great tit, evolution can work fast enough for genetic adaptation to keep pace with a changing environment. However, even for such fast-evolving species, evolution on its own is not enough. By studying individual birds over multiple years, the team were able to show that individual birds have a built-in flexibility that enables them to adjust their behaviour rapidly in response to short-term changes in the environment. This flexibility -- known as phenotypic plasticity -- greatly increases the chances that a population can survive in spite of short-term changes, but that possibility depends on how closely they can track the key aspects of their environment, such as the availability of food. As species become longer-lived, and thus slower to reproduce, evolutionary adaptation is far slower and can't on its own save such species from climate change-induced extinction

Oscar Vedder, Sandra Bouwhuis, Ben C. Sheldon. Quantitative Assessment of the Importance of Phenotypic Plasticity in Adaptation to Climate Change in Wild Bird Populations. *PLoS Biology*, 2013; 11 (7): e1001605 DOI: [10.1371/journal.pbio.1001605](https://doi.org/10.1371/journal.pbio.1001605)

### **Painted turtles set to become all-female**

By altering phenology, organisms have the potential to match life-history events with suitable environmental conditions. Because of this, phenological plasticity has been proposed as a mechanism whereby populations might buffer themselves from climate change. Researchers examined the potential buffering power of advancing one aspect of phenology, nesting date, on sex ratio in painted turtles (*Chrysemys picta*), a species with temperature-dependent sex determination. Results suggest that females will not be able to buffer their progeny from the negative consequences of climate change by adjusting nesting date alone. Not only are offspring sex ratios predicted to become 100% female, but many nests are projected to fail. (Telemeco et al., Modeling the Effects of Climate Change–Induced Shifts in Reproductive Phenology on Temperature-Dependent Traits, [American Naturalist](https://doi.org/10.1086/670051), DOI: 10.1086/670051; [Genome Biology](https://doi.org/10.1186/gb-2013-14-3-r28), DOI:10.1186/gb-2013-14-3-r28)

### **Summary of Science, Activities, Programs, and Policies That Influence the Rangewide Conservation of Greater Sage-Grouse** (climate change analysis pp. 101-106)

This report documents and summarizes several decades of work on sage-grouse populations, sagebrush as habitat, and sagebrush community and ecosystem functions based on the recent assessment and findings of the USFWS under consideration of the Endangered Species Act. (Wood et al., U.S. Geological Survey Open-File Report 2013–1098, 170 p., <http://pubs.usgs.gov/of/2013/1098/>)

### **Climate Change Threatens Forest Survival on Drier, Low Elevation Sites**

Predicted increases in temperature and drought in the coming century may make it more difficult for conifers such as ponderosa pine to regenerate after major forest fires on dry, low-elevation sites, in some cases leading to conversion of forests to grass or shrub lands, a report suggests. Researchers from Oregon State University concluded that moisture stress is a key limitation for conifer regeneration following stand-replacing wildfire, which will likely increase with climate change. This will make post-fire recovery on dry sites slow and uncertain. If forests are desired in these locations, more aggressive attempts at reforestation may be needed. The study, published in *Forest Ecology and Management*, was done in a portion of the Metolius River watershed in the eastern Cascade Range of Oregon, which prior to a 2002 fire was mostly ponderosa pine with some Douglas-fir and other tree species. The research area was not salvage-logged or replanted following the severe, stand-replacing fire

### **Climate-Aquatics Blog**

#44: Part 3, Mechanisms of change in fish populations: Lower summer flows & drought effects on growth & survival;

and #45: Part 4, Mechanisms of change in fish populations: Temperature effects on growth & survival (Dan Isaak, Boise Aquatic Research Lab, Rocky Mountain Research Station, US Forest Service)

### **Our Forests in the [Water] Balance**

This USFS Rocky Mountain Research Station bulletin provides a review of how climate change is altering the amount and type of precipitation that falls across the western United States.

(Science You Can Use Bulletin, May/June 2013) Key findings include:

- (1) Climate change is expected to increase the variability and unpredictability of precipitation across the West. This has the potential to cause forest die-off from drought, insect or pathogen outbreaks, and more wildfires.
- (2) Drier years are growing drier. Over the past several decades, low-flow levels have declined in many streams across the Pacific Northwest.
- (3) Years with less annual precipitation not only experience lower streamflows but also a greater number of acres burning in wildfires.
- (4) Fires burning under relatively dry conditions tend to burn more severely.
- (5) The death of more than 20% of trees in a watershed can result in greater streamflow, especially in areas that receive 20 inches or more of precipitation each year.
- (6) Rain events following wildfires can cause rates of erosion that are several orders of magnitude larger than average conditions.

### **U.S. Amphibian Populations are Declining**

A new study found that amphibian populations in the United States are disappearing from occupied habitats at an average rate of 3.7% each year. Researchers examined amphibian occupancy data from 2002-2011 and found declining trends in all parts of the country, including federally managed and protected areas, such as national parks. [\[FullText\]](#)

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

### **The President's Climate Action Plan Released**

President Obama on June 25th announced the President's Climate Action Plan stating that "climate change represents one of the greatest challenges of our time." The Plan consists of a wide variety of executive actions focused around three pillars: cut carbon pollution in the United States; prepare the United States for the impacts of climate change; and, lead international efforts to combat global climate change and prepare for its impacts. The Plan includes sections on establishing a state, local, and tribal leaders task force, preparing for future floods, managing drought, boosting the resilience of infrastructure, supporting communities, and preparing a toolkit for climate resilience, in addition to many other topics. The Plan also states that federal agencies will be directed to ensure that climate risk-management considerations are fully integrated into federal infrastructure and natural resource management planning. To view the President's Climate Action Plan, visit: <http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf>.

### **Family Forest Owners and Climate Change: Understanding, Attitudes, and Educational Needs**

Twenty-four focus groups were held throughout the Pacific Northwest to assess family forest owners' perceptions, understanding, and educational needs related to climate change and its potential impacts on family-owned forests. Participants cited many information sources and often referenced personal observations and connections. Perceptions of climate science were mixed, but skepticism was common, particularly regarding the extent to which research is driven by politics, money, or ideology. Most participants did not expect to make significant

changes to their management in anticipation of climate change. However, many participants wanted to learn more about climate change and how it might affect their forests. Results of these focus groups should provide insights for integrating climate science into extension programming in a variety of contexts, and suggestions for future extension programming are presented. (Grotta et al., March, 2013, Journal of Forestry)