

Greetings and welcome to the **OCTOBER, 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>.

Thanks for contributions this month from Marc Hayes, Gary Wiles, Joe Buchanan, Bob Vadas and Michael Schroeder

WHAT'S HAPPENING AT WDFW?

The new Washington Marine Resources Advisory Council to address Ocean Acidification – Director Anderson will represent WDFW

The 2013 Legislature enacted [Engrossed Senate Bill 5603 Section 4](#) establishing the Washington Marine Resources Advisory Council. The Council is created within the Office of the Governor, with specified membership that includes WDFW, represented by Director Anderson. Among other things, the Council's duties are to advise and work with UW and others to conduct ongoing technical analysis on the effects and sources of ocean acidification. The first meeting of the new Council is expected to occur early to mid-November, and the Council will expire June 30, 2017. See below for links to recent stories about Ocean Acidification, under the “Species and Habitats” tab, and an evening panel presentation in Olympia on October 16th under the “Learning Opportunities” tab.

White tailed Ptarmigan study to inform potential listing

In 2010 the Mt. Rainier subspecies of the white-tailed ptarmigan (*Lagopus leucura*) in Washington State was petitioned to be federally listed as a threatened species by the Center for Biological Diversity, with the primary argument that ptarmigan living in naturally fragmented alpine habitats are at high risk of extirpation due to climate change. In 2012 the U.S. Fish and Wildlife Service determined that the petition warranted a more in-depth examination of the status of the subspecies. [Michael Schroeder](#) (WDFW Research Scientist) is working on a research project to capture and band ptarmigan in key locations and to collect feather samples for genetic analysis in Mt. Rainier National Park and the Alpine Lakes Wilderness. Both of these areas support substantial ptarmigan habitat separated by more than 50 km of mostly non-ptarmigan habitat, the largest gap of non-ptarmigan habitat in the Cascades of Washington. Collection of feather samples from at least 10 individuals from both areas, and comparison with available samples from the Pasayten Wilderness in northern Okanogan County will help determine the level of connectivity among ptarmigan populations in the state. For more information, contact Michael.

CLIMATE ADAPTATION AT OTHER ORGANIZATIONS

West Coast Ocean Acidification and Hypoxia Science Panel

An interdisciplinary [West Coast Ocean Acidification and Hypoxia Science Panel](#) (OAH Panel) was launched August 2013. The OAH Panel will advance decision-makers' understanding of drivers and impacts of ocean acidification and hypoxia by synthesizing and translating knowledge from this

scientifically diverse and rapidly evolving field of research. The OAH Panel will also identify research and monitoring priorities that will augment our knowledge of these complex issues into the future. The knowledge base established in Washington, with the work of the Blue Ribbon Panel on Ocean Acidification will provide a robust foundation for the work of the OAH Panel, resulting in a West Coast-wide understanding of ocean acidification and hypoxia that will inform multiple levels of government. The Panelists include the two Co-Directors of the University of Washington Center on Ocean Acidification established in July 2013.

Swinomish Tribe releases “Facing Climate Change”

This four minute video focuses on how sea level rise will affect coastal tribes, as seen through the eyes of the Swinomish Tribe in Washington State. <http://bit.ly/1gb3d57>

National Park Service – Climate Change Response Program

July- September Newsletter attached. This bimonthly publication is intended to share the latest actions relating to NPS efforts to manage our parks in a changing climate. This issue features stories on scenario planning, and new science and education programs on climate change throughout the national park system.

LEARNING OPPORTUNITIES

Thursday, October 3, 10:00-11:30 (Pacific time), “Managing Coastal Watersheds to Address Climate Change: Vulnerability and Adaptation in the Middle Patuxent Subwatershed”,

The National Wildlife Federation and NOAA invite you to join this overview of how to address climate change (both vulnerability and adaptation) through a case study at a subwatershed level in the Chesapeake Bay. Although the case study is specific to the Chesapeake Bay the information from the project will be useful to those working within this watershed and beyond. A summary of the report on which the webinar is based is attached and can be found at the following website: <http://www.nwf.org/What-We-Do/Energy-and-Climate/Climate-Smart-Conservation/Adaptation-Reports.aspx>. Please register by clicking on the link below.

<https://www4.gotomeeting.com/register/968818127>

**** Note: Check for Cancellations due to Federal Government Shutdown!****

October 3, 12:30 p.m. (Pacific Time) “Climate change and Rocky Mountain ungulates”,

Matthew Kauffman, USGS Wyoming Cooperative Fish and Wildlife Unit. National Climate Change and Wildlife Science Center Webinar Many ungulate populations in the Rocky Mountains are predicted to respond to declining snow levels and increased drought, though in ways that remain uncertain. We are investigating how climate change may affect the abundance of Rocky Mountain ungulates, their migration patterns, the degree to which they transmit diseases to livestock, and their herbivory impact on aspen (*Populus tremuloides*). [Learn more and register here.](#)

**** Note: Check for Cancellations due to Federal Government Shutdown!****

October 9th, “Megastorm Aftermath”, at 9PM on PBS

Set the DVR and get some Popcorn --- One year after Sandy, correspondent Miles O’Brien and NOVA follow up on the 2012 film **Inside the Megastorm**, with a fresh investigation of the critical questions raised by this historic storm: Was Megastorm Sandy a freak combination of weather systems? Or are hurricanes increasing in intensity due to a changing climate? What can we do to prepare ourselves for

the next Sandy, and what progress has been made toward making our urban infrastructure more resilient? Much of Sandy's wrecking power was due to an extreme storm surge that left large swaths of New York and New Jersey underwater. And with sea levels on the rise, flooding will only become more frequent. NOVA examines the role of climate change in driving these rising seas, and looks at some of the latest extraordinary engineering employed in other areas, as well as what it may take to make cities like New York more resilient in the future. Supported by the Kresge Foundation.

<http://www.pbs.org/wgbh/nova/earth/megastorm-aftermath.html>

October 16th, "Ocean Acidification Panel Discussion", South Sound Estuary Association's October Speaker Event, 7-8:30 pm program,

LOTT WET Science Center, 500 Adams St NE, Olympia.

Panel to include Dr. Richard Feely, NOAA, Bill Dewey, Taylor Shellfish, Terry Williams, Tulalip Tribe, and Jay Manning, Cascadia Law Group. Details are in the attached PDF

***BROWN BAG PRESENTATION AT THE NATURAL RESOURCES BUILDING**

October 24th, "Projected climate-impacts on selected focal species in the PNW", WDFW sponsored brown bag presentation and discussion, 12:15- 2:00 pm, Room 172, Natural Resource Building

Webex will be available for those wishing to participate remotely – please email Lynn for sign up info.

Chad Wilsey, a researcher from UW, will present results from his work modeling climate-impacts on wildlife populations. Projections are made using spatially explicit population models incorporating projected climate and vegetation data. These models represent a step forward in climate-impacts modeling because they simulate demographic and dispersal processes as well as provide estimates of projected change in relative abundance of wildlife populations. This research is part of [the Pacific Northwest Climate Vulnerability Assessment Project](#). On October 24th Chad will be presenting modeling results for the following species: Wolverine, Lynx, Columbia Spotted Frog, Lynx, Townsends Ground Squirrel, Pygmy Rabbit. For more information contact Lynn

November 14, 10:00 a.m., (Pacific Time), "Impacts of Sea Level Rise on National Parks", by Rebecca Beavers and Courtney Schupp of the US National Park Service. Climate change and sea level rise will challenge National Park efforts to protect natural and cultural resources and to provide visitor access and recreational opportunities. Learn how several national parks are addressing these challenges: collecting baseline data on archaeological sites that are vulnerable to rising water levels and associated changes in biological activity and visitor use; incorporating barrier island processes into long-term development plans including visitor facilities; and engaging in a regional multi-agency effort to restore coastal areas impacted by a major hurricane. **Register for the webinar at**

<https://www1.gotomeeting.com/register/846023408>.

December 12, 10:00 a.m.,(Pacific Time), "Assessing Habitat and Community Sensitivity to Climate Change Impacts", by Jeff Crooks of the Tijuana River National Estuarine Research Reserve and Dwight Trueblood of NOAA. The National Estuarine Research Reserves (NERRS) are uniquely positioned across the U.S. to assess climate change impacts and the sensitivity of representative coastal habitats to them. The NERRS Climate Sensitivity Study identified key anthropogenic and climatic stressors affecting each reserve's ecological and social landscape and then analyzed the social and bio-physical sensitivity to these stressors. Presenters will share key findings from this study, and the Tijuana River Reserve in California will discuss their collaborative efforts to develop a vulnerability assessment

that informs an Adaptation Strategy to address sea level rise and riverine flooding. **Register for the webinar at <https://www1.gotomeeting.com/register/858423992>.**

RECORDED WEBINARS:

Two presentations on the Western Governors Association and LCC Project on Riparian Mapping are now available. This project is an effort to develop high-resolution maps of potential riparian areas, their condition, and their climate adaptation potential, for the Pacific Northwest.

To watch the presentation on Riparian Location and Condition Mapping, click the following link:

<https://wadismetings.webex.com/wadismetings/ldr.php?AT=pb&SP=MC&rID=68501022&rKey=0193f6f2b1de66ae>

To watch the presentation on Riparian Climate-Corridor Mapping, click the following link:

<https://wadismetings.webex.com/wadismetings/ldr.php?AT=pb&SP=MC&rID=70560817&rKey=88a606d174e74cae>

RESOURCES

Presentations available for the Fourth Annual Pacific Northwest Climate Science Conference

The Fourth Annual Pacific Northwest Climate Conference drew about 320 researchers and practitioners to Portland in early September. Videos of many of the talks have been posted and many more will be linked to the [agenda](#), at pnwclimateconference.org.

Reasonably Foreseeable Futures: Climate Change Adaptation And The National Environmental Policy Act

The National Environmental Policy Act (NEPA) clearly has a role to play in how projects with a federal nexus prepare for climate change. To help agencies improve their consideration of climate change, the Council on Environmental Quality (CEQ) in February 2010 released Draft NEPA Guidance, which addressed both emissions and effects of climate change on agency actions and the affected environment. Defenders of Wildlife recently released a report which analyzed 154 Final Environmental Impact Statements released between July 2011 and April 2012, and found that very few incorporated the climate adaptation elements of the 2010 draft guidance. Even the best-performing EISs tended to incorporate climate change into a limited number of the elements of the affected environment, failed to make a full comparison between the various alternatives, or used short and qualitative statements rather than full analysis based on the best available science. This paper explores possible reasons for these deficiencies and presents recommendations for overcoming these obstacles. <http://www.defenders.org/publication/reasonably-foreseeable-futures-climate-change-adaptation-and-national-environmental>

CLIMATE SCIENCE NEWS

IPCC releases 5th Assessment on Global Climate Change - [Says Upper Limit on Emissions Is Nearing](#)

(From NY Times, September 27th, 2013)

For the first time, the world's top climate scientists on Friday formally embraced an upper limit on greenhouse gases while warning that it is likely to be exceeded within decades if emissions continue at a brisk pace, underscoring the profound challenge humanity faces in bringing global warming under control. A panel of experts appointed by the United Nations, unveiling its latest assessment of climate research, reinforced its earlier conclusions that global warming is real, that it is caused primarily if not exclusively by human emissions, and that it is likely to get substantially worse unless efforts to limit those emissions are rapidly accelerated. "Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes," the report said. "It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century."

For access to the summary report for policymakers and all associated reports, click [here](#).

IPCC to explain why global warming appears to have slowed down during the past 15 years even though greenhouse gas emissions keep rising.

(from Boston Globe, September 20, 2013)

Climate skeptics have used the lull in surface warming since 1998 to cast doubt on the scientific consensus that humans are cooking the planet by burning fossil fuels and cutting down CO₂-absorbing forests. The IPCC report is expected to affirm the human link with greater certainty than ever, but the panel is under pressure to also address the recent lower rate of warming, which scientists say is probably due to heat going deep into the ocean and natural climate fluctuations.

PNW Climate Impacts and Outlook --- Climate recap, June-August 2013

Summer 2013 was 3rd warmest on record in the Pacific Northwest (OR, WA, ID). The regionally averaged temperature was 66.4°F which is 2.9°F above normal. Summer precipitation, averaged over the region, was 2.63", only 0.25" below normal. Records date back to 1895 (NCDC Climate at a Glance). For the full newsletter of the climate recap and outlook for fall/winter, click [here](#).

[Research Cites Role of Warming in Extremes](#)

(from NY Times, September 6, 2013)

In examining a dozen extreme weather events last year, scientists found evidence that human activity was a partial culprit in about half....The articles' editors likened climate change to someone habitually driving a bit over the speed limit. Even if the speeding itself is unlikely to directly cause an accident, it increases the likelihood that something else — a wet road or a distracting text message — will do so and that the accident, when it occurs, will be more calamitous. Even when global warming contributes to extreme weather, "natural variability can still be the primary factor in any individual extreme event," the editors wrote. To examine causes of the Midwest drought last year, the most severe since the 1950s, researchers ran computer models comparing two situations: one with present-day concentrations of carbon dioxide and other greenhouse gases, the other with the much lower greenhouse gas concentrations before the Industrial Revolution. They found little difference in the frequency of Midwest droughts. But scientists performing a similar comparison for the heat wave that blanketed much of the United States in July last year estimated that such heat waves now occur four times as frequently because of the influence of greenhouse gas emissions.

Global warming has increased risk of record heat

Researchers calculate that intense heat like that in the summer of 2012 is up to four times more likely to occur now than in pre-industrial America, when there was much less carbon dioxide in the atmosphere. > *full story*

Five Unusual Ways Scientists Are Studying Climate Change

Smithsonian Science Surprises August 23, 2013

SPECIES AND HABITATS

The *Seattle Times* recently released one of the most comprehensive series of reports to date by a newspaper on the topic of ocean acidification.

Sea Change is a multi-media piece that reports on the science and impacts of ocean acidification both globally and in the Pacific Northwest.

The series of stories ran in print form from Sunday, Sept 15 through Tuesday, Sept 17, 2013 (online versions were posted earlier). You can find the stories, videos, maps, photos, animations, and other features for each of the stories at:

- “Sea Change: The Ocean’s Perilous Turn”, Sunday, Sept 15, 2013: <http://apps.seattletimes.com/reports/sea-change/2013/sep/11/pacific-ocean-perilous-turn-overview/>
- “Alarm Over Crab”, Monday, Sept 16, 2013: <http://apps.seattletimes.com/reports/sea-change/2013/sep/11/alaska-crab-industry/>
- “Oysters Hit Hard”, Tuesday, Sept 17, 2013: <http://apps.seattletimes.com/reports/sea-change/2013/sep/11/oysters-hit-hard/>

For more on Washington State’s efforts to address ocean acidification, see <http://www.ecy.wa.gov/water/marine/oceanacidification.html>.

For more on the University of Washington’s role in leading the new Center on Ocean Acidification Impacts and Adaptation, see: <http://tinyurl.com/uw-center-on-oo>.

EPA Releases Report of Climate Change Impacts on Streamflow and Water Quality in 20 Watersheds in the United States

There is growing concern about the potential effects of climate change on water resources. To develop this report, watershed modeling was conducted in 20 large U.S. watersheds to characterize the sensitivity of

streamflow, nutrient (nitrogen and phosphorus), and sediment loading to a range of plausible mid-21st century climate change and urban development scenarios. The report also provides an improved understanding of

methodological challenges associated with integrating existing tools (e.g., climate models, downscaling approaches, and watershed models) and data sets to address these scientific questions. To view the study and related links, visit:

<http://cfpub.epa.gov/ncea/global/recordisplay.cfm?deid=256912>.

Adaptive strategies and life history characteristics - in a warming climate: Salmon in the Arctic?

Nielsen, J.L., G.T. Ruggione, and C.E. Zimmerman. 2013. *Environmental Biology of Fishes* 96: 1187-1226 (cf. <http://link.springer.com/article/10.1007%2Fs10641-012-0082-6>). This paper reviews the recent

history of salmon in the Arctic and explores various patterns of climate change that may influence range expansions and future sustainability of salmon in Arctic habitats. A summary of the research needs that will

allow informed expectation of further Arctic colonization by salmon is given.

ATTACHED FROM RESEARCHGATE HERE (i.e.,

https://www.researchgate.net/publication/236159102_Adaptive_strategies_and_life_history_characteristics_in_a_warming_climate_Salmon_in_the_Arctic).

Riparian Ecosystems in the 21st Century: Hotspots for Climate Change Adaptation?

Riparian ecosystems in the 21st century are likely to play a critical role in determining the vulnerability of natural and human systems to climate change, and in influencing the capacity of these systems to adapt. Some authors have suggested that riparian ecosystems are particularly vulnerable to climate change impacts due to their high levels of exposure and sensitivity to climatic stimuli, and their history of degradation. Others have highlighted the probable resilience of riparian ecosystems to climate change as a result of their evolution under high levels of climatic and environmental variability. The attached paper synthesizes current knowledge of the vulnerability of riparian ecosystems to climate change by assessing the potential exposure, sensitivity, and adaptive capacity of their key components

and processes, as well as ecosystem functions, goods and services, to projected global climatic changes. PAPER ATTACHED

Climate change may speed up forests' life cycles

Many climate studies have predicted that tree species will respond to global warming by migrating via seed dispersal to cooler climates. But **a study of 65 different species in 31 eastern states finds that nearly 80 percent of the species are staying in place and speeding up their life cycles.** The Duke University-led study, published online Wednesday in the peer-reviewed journal *Global Change Biology*, is the first to show that a changing climate may have dual impacts on forests. It adds to a growing body of evidence, including a 2011 study by the same Duke team, that climate-driven migration is occurring much more slowly than predicted, and most plant species may not be able to migrate fast enough to stay one step ahead of rising temperatures

Kai Zhu, Christopher W. Woodall, Souparno Ghosh, Alan E. Gelfand, James S. Clark. **Dual impacts of climate change: forest migration and turnover through life history.** *Global Change Biology*, 2013; DOI: [10.1111/gcb.12382](https://doi.org/10.1111/gcb.12382)

Are Arctic terns and red knots climate canaries in the coal mine?

Migration of fish to colder waters, changes in phenology due to earlier springs – these are but two consequences of climate change that are putting birds at risk. Recent studies examine possible reasons for starvation among Arctic terns in Maine and the results of birds and insect and plant food sources responding to earlier springs at different rates.

Move over, polar bears; moose may be the new climate-change poster child

Puzzled by precipitous declines in the state's moose populations, Michigan has undertaken a study to discover the cause of the iconic north woods animals' demise. Suspected perpetrator: climate change, in its many manifestations. Warming temperatures can kill the large herbivores outright, but related

phenomena such as the increase in ticks and vector-borne diseases likely cause more deaths. Some researchers posit that higher temperatures and drought increase levels of chemicals in moose's foods that turn into neurotoxins in their digestive systems.

[Insight into marine life's ability to adapt to climate change](#)

A study into marine life around an underwater volcanic vent in the Mediterranean, might hold the key to understanding how some species will be able to survive in increasingly acidic sea water should anthropogenic climate change continue. Researchers have discovered that some species of polychaete worms are able to modify their metabolic rates to better cope with and thrive in waters high in carbon dioxide (CO₂), which is otherwise poisonous to other, often closely-related species. The study sheds new light on the robustness of some marine species and the relative resilience of marine biodiversity should atmospheric CO₂ continue to cause ocean acidification

[Warming oceans causing marine species to change breeding times and shift habitats toward poles much faster than land-based species](#)

Findings of the three-year research project, conducted by a working group of University of California, Santa Barbara's National Center for Ecological Analysis and Synthesis, NCEAS, and funded by the U.S. National Science Foundation, are published in the current issue of the journal "Nature Climate Change."

[Modeling climate change impacts on tidal marsh birds: Restoration and conservation planning in the face of uncertainty](#)

Samuel D. Veloz, et al, Ecological Society of America Ecosphere, August 2013

This study projects the future distribution and abundance of five marsh bird species (through 2110) in response to changes in habitat availability and suitability as a result of projected sea-level rise, salinity, and sediment availability in the San Francisco Estuary. To bracket the uncertainty, four future scenarios were considered, based on two sediment availability scenarios (high or low), and two rates of sea-level rise (0.52 or 1.65 m/100 yr). The study also evaluated three approaches for using model results to inform the selection of potential restoration projects: (1) Use current conditions only to prioritize restoration. (2) Use a single future scenario (among the four referred to above) in combination with current conditions to select priority restoration projects. (3) Combine current conditions with all four future scenarios, while incorporating uncertainty among future scenarios into the selection of restoration projects. The results and data have been made available via an interactive decision support tool at www.prbo.org/sfbayslr.

Articles explore climate change impacts and adaptation strategies for North American Rangelands.

Two recent articles in Rangeland Ecology and Management (September 2013) explore projected impacts on rangelands and also review possible mitigation and adaptation strategies -- "Climate Change and North American Rangelands: Assessment of Mitigation and Adaptation Strategies", Joyce et al, and "Climate Change and North American Rangelands: Trends, Projections, and Implications", Polley et al, (attached)

POLICY AND MANAGEMENT - MITIGATION AND ADAPTATION

[Climate change our most serious security threat](#)

(from the San Francisco Chronicle)

Ask Adm. [Samuel Locklear III](#), commander of the U.S. military's sprawling Pacific Command, what his most serious threat is, and you might be surprised. There's a long list of possibilities, after all: North Korean nukes, rising Chinese military power and aggressive cyberespionage, multiple territorial disputes between major powers and persistent insurgencies from the Philippines to Thailand, not to mention protecting some of the world's most vulnerable shipping choke points. Add all of that up, though, and there's something even more dangerous to keep even the most seasoned military officer up at night: the looming disaster of climate change. Locklear is not alone in his assessment. He is one among a rising chorus of voices from the national security community, from senior military and intelligence officials to front-line combat veterans, united by what is fast becoming a consensus view. Climate change is much more than an environmental or public health issue. The phenomenon, and the dangerous fossil fuel dependency that drives it, is among the most serious national security threats we face. Our dependence on fossil fuels - oil, in particular - is a crucial part of the threat. A new generation of combat veterans has seen the consequences firsthand on the battlefields of Afghanistan and Iraq.

[Crop Pests Moving Northward](#)

Pests that attack the plants humanity relies on for food have been creeping poleward at an average rate of almost 2 kilometers (3 miles) each year for the last 50 years, according to a new study of hundreds of harmful organisms in the journal *Nature Climate Change*. The primary cause of the spread of the insects, fungi and viruses is humans transporting them with crops and farming equipment, but the broad swath of species moving poleward also appears to be riding on the back of global warming, which is making it possible for those pests to take root in places that were just too cold in bygone times, say the researchers. In all, 612 crop pests and pathogens were investigated by the University of Exeter's Daniel Bebber, Sarah Gurr and Mark Ramotowski of University of Oxford. This is the first study of so many pests -- including fungi, bacteria, viruses, viroids, water molds, insects and nematodes -- to look for a climate-related trend. What they found was that the average poleward shift was 2.7 kilometers (1.7 miles) per year since 1960, with significant differences among the pests. There were a few nematodes and viruses that were moving the other way, but they were in the minority. The danger the pests pose is alarming because most of the largest crops grown in the world today are not really up for a fight against new pathogens, explained Gurr, who is a fungi researcher. "In the process of boosting food production we have also created vast monocultures of, for instance, wheat," said Gurr. "These genetically limited plants are very vulnerable." <http://www.nature.com/nclimate/journal/vaop/ncurrent/full/nclimate1990.html>

Implementation Guide for Local Governments to Prepare for Climate Change in British Columbia is Released

Local governments have a lead role to play in ensuring our communities will be resilient and sustainable in light of challenges such as rising sea levels in coastal areas, more extreme weather events, increased risk of flooding and forest fires, and the possibility of seasonal water shortages. "Preparing for Climate Change: An Implementation Guide for Local Governments in British Columbia" is a new resource developed by West Coast Environmental Law that looks at the tools available, and highlights useful experiences and good practices from around the province and elsewhere in Canada. This publication received a 2013 Gold Award for Excellence in Planning from the Planning Institute of British Columbia. It was a project of the British Columbia Regional Adaptation Initiative. To view the report, visit: <http://wcel.org/adaptation>.

Climate Resources for Educators: Interactive Climate Webcasts for Classrooms

ClimateChangeLIVE is a collaboration of federal agencies and non-governmental organizations providing educators with a range of free tools for teaching climate concepts for the 2013-2014 school year.

Through webcasts, webinars, and online climate education resources, ClimateChangeLIVE provides a distance learning adventure aligned with national science education standards and gathered from 17 federal agency and non-governmental organizations partners. Electronic field trips are also available as a way to learn about climate change science directly from climate experts and educators and to have the chance to interact with them during the ClimateChangeLIVE webcasts and on social media. To learn more, visit: <http://climatechangelive.org/>.