



DEFENDERS OF WILDLIFE



## Seeds of Resilience:

Safeguarding Wildlife and Habitat from Climate Change  
through the Farm Bill Conservation Programs





## DEFENDERS OF WILDLIFE

Defenders of Wildlife is a national, nonprofit membership organization dedicated to the protection of all native wild animals and plants in their natural communities.

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Cover images, clockwise from top left: Farmer inspecting his badly eroded fields, photo courtesy NRCS. Greater sage grouse. Photo by Stephen Ting, courtesy USFWS. Flooded farm along the North Red River, Perley, Minnesota. Photo by Andrea Booher, courtesy NOAA. Opposite page: The view from Harney County, Oregon. Photo by Bruce Taylor, Defenders of Wildlife.

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# Farm Bill Conservation Programs and Climate Change Adaptation

Climate change is already affecting agricultural production across the nation and around the world through changes in temperature and precipitation, increases in extreme precipitation events, drought, climate-induced expansions of pests and disease, and the loss of critical ecosystem services. These impacts are expected to increasingly cause disruptions and declines in food production, challenging food security as the global population continues to grow (Walthall et al. 2012, Hatfield et al. 2014). Wildlife and natural ecosystems, already impacted by agriculture and human land use, are also threatened by climate change. Action is needed to safeguard natural and agricultural resources and to build the adaptive capacity of both wildlife and working lands as the climate changes (NFWPCAP 2012, Walthall et al. 2012).

Photographs, below, left to right: Organic vegetables ready for a farmers' market in Saucier, Mississippi. Photo by Stephen Kirkpatrick, courtesy USFWS. Swallowtail butterfly and native bumblebee share a thistle blossom at Edwin B. Forsythe National Wildlife Refuge, New Jersey. Photo by John and Karen Hollingsworth, courtesy USFWS. Next page: Hmong farmers in Fresno, California. Photo by Bob Nichols, courtesy USFWS.



The need to build resilience to climate change has been recognized by the USDA as part of its most recent Strategic Plan (USDA 2010). The conservation programs authorized through the 2014 Farm Bill (P.L. 113-79) can make important contributions to climate change adaptation by incentivizing the adoption of more sustainable agricultural policies designed to increase the resilience of agricultural and natural systems. These programs represent one of the most important sources of private land conservation funding in the United States, providing money for easements, wetland restoration, forest management, wildlife habitat creation and improvement, and other land management practices. Conservation programs have accomplished significant conservation success, but these programs must be reassessed in the context of climate change to ensure that they are using conservation dollars most effectively to advance national policy goals related to wildlife and natural resource adaptation and to increase the resiliency of working lands.

This paper highlights ongoing climate adaptation planning and capacity building efforts within the USDA, and outlines guidance for utilizing the Farm Bill conservation programs to meet its strategic objectives to enhance the resilience and adaptive capacity of working lands and biodiversity. We suggest that conservation programs will be most effective when they promote sustainable agriculture practices that conserve natural resources, enhance ecosystem services, and protect critical landscapes and habitat for native wildlife. In particular, we urge the USDA to:

1. Use scale-appropriate science and planning tools to incorporate climate change into program delivery;
2. Work collaboratively to increase the pace of land conservation;
3. Build resilience in agricultural and natural systems by supporting ecosystem services;
4. Target conservation program delivery to areas and priorities where it will have the greatest impact;
5. Evaluate effects of conservation program delivery to improve conservation outcomes and allow flexibility to course correct as needed;
6. Ensure adaptation and mitigation practices are complementary;
7. Enhance capacity for effective program delivery that addresses the challenges from climate change;
8. Motivate landowners to implement climate-smart conservation practices.

We also provide program recommendations intended to increase conservation success achieved through Farm Bill conservation programs as the climate changes.

The original group of Hmong farmers who settled in the Fresno, California area. Photo by Bob Nichols, courtesy NRCS.



# Introduction

Across the country, farmers, ranchers and forest landowners are seeing an increase in risk to their operations due to fires, increases in invasive pests, droughts and floods. . . These events threaten America's food supply and are costly for producers and rural economies. Drought alone was estimated to cost the U.S. \$50 billion from 2011 to 2013. Such risks have implications not only for agricultural producers, but for all Americans.

— *Secretary Vilsack, USDA News Release, May 6, 2014*

In May of 2014, for the first time this century, the U.S. Drought Monitor placed the entire state of California under a severe drought condition or worse (Rice 2014). Drought in California, the nationwide leader in the value of agricultural products sold (USDA 2014), is already having major impacts on producers, including \$3.56 billion in crop losses, and lost productivity on 800,000 acres of fields that now lie fallow. The drought also affects consumers — new research conducted at Arizona State University paints a grim picture of what this period of extended drought will do to food prices across the country. The study predicts significant price increases in popular varieties of produce, including berries, broccoli, grapes, melons, tomatoes, peppers, and packaged salad (Arizona State University 2014). Avocado prices, for instance, may increase by 28 percent. The study's authors also note that even if the drought ended today, prices will remain elevated for many months because the mountain snow-pack that provides water for irrigation during the hot, dry California summers is also critically low, averaging just 18% of normal (CDW 2014). And it is not just California: agricultural systems in many parts of the world are already threatened by warming temperatures and changes in precipitation. Climate change is expected to increasingly cause disruptions and declines in food production, challenging food security as the global population grows towards nine billion people by 2050 (Walthall et al. 2012, Hatfield et al. 2014).

Extreme weather events, which are expected to increase in frequency with climate change, will also influence agricultural productivity and may lead to catastrophic losses over a growing season or within a herd of livestock (Walthall et al. 2012). One such example occurred on October 4 and 5, 2013, when Winter Storm "Atlas" hit one of the largest cattle producing regions in South Dakota. Cattle that had not yet grown their protective winter coats were still grazing on summer pastures and enjoying 70 and 80 degree temperatures. Many had only recently been moved to South Dakota to escape persistent drought on grazing lands in Texas. When the unseasonal storm hit the cows were first exposed to hours of freezing rain, followed by over 4 feet of snow and 70 mile per hour winds. The combination proved fatal — almost 100,000 cows and calves died and some ranchers lost well over half their herd at a time when the federal government, and the disaster aid programs it administers, was shut down due to the budget standoff (Hirtzer 2013).

The impacts of climate change on working lands will be magnified by losing critical ecosystem services — benefits like water storage and pollination provided by functioning ecosystems and biodiversity. Climate change reduces the ability of natural systems to provide ecosystem services (Groffman et al. 2014) at the same time as these services are threatened by many other human-induced changes. For example, 75% of the leading global food crops depend on

pollination by animals (Klein et al. 2007) – a service that may be especially vulnerable to climate change (Root et al. 2003) and one also threatened by pesticide use and habitat loss. Similarly, the destruction of wetland and floodplain habitat, vitally important as buffers from flooding, will amplify the impacts of heavy rainfall events predicted under climate change. In the Lower Mississippi River Valley over 90 percent of floodplain habitat has been lost; flood control now often depends on costly human interventions. In May of 2011, facing disastrous flooding following a winter and spring of heavy snow and rain in the Upper Mississippi, the federal government opened the Morganza spillway in Louisiana for the first time since the 1970s. This action spared New Orleans from the brunt of the floodwaters, but devastated the agricultural land in the path of the spillway. Making matters worse, the region was experiencing a drought at the time; farmers with land spanning both sides of the levee lost crops to drought on one side, and saw their fields flooded on the other. Opening the Spillway resulted in the loss of 95,500 acres of cropland and over 31,000 acres of pasture with a price tag of over \$45 million in crop losses (Guidry 2011) and over \$1 million in lost forage (Carlson et al. 2011). There were also impacts to fish and wildlife, residents, the oil and gas industry, sport and commercial fisheries, infrastructure, and the tourist industry (Carlson et al. 2012).

Besides its effects on agriculture and rural communities, climate change will also worsen the plight of many wildlife species, including some that are conservation priorities for NRCS. One notable example is the Greater sage-grouse (*Centrocercus urophasianus*). An obligate of highly imperiled sagebrush ecosystems, the species has lost habitat across the West to land conversion and fragmentation, agriculture and grazing, urbanization, energy development, wildfire, and invasive species (Aldridge et al. 2008, Connelly et al. 2004, Lyon and Anderson 2003, Schrag et al. 2010). Recognizing these threats, NRCS in 2010 partnered with the U.S. Fish & Wildlife Service to launch the Sage Grouse Initiative, aimed at helping farmers and ranchers use Farm Bill conservation programs to improve sage grouse habitat (USFWS-NRCS 2010).

Unfortunately, these efforts may be hampered by the effects of climate change, which is a recognized threat to Greater sage-grouse (Connelly et al. 2011b: 556, Table 24.2; Blomberg et al. 2012; van Kooten et al. 2007), and is predicted to have deleterious impacts on sagebrush steppe (Schlaepfer et al. 2012; Neilson et al. 2005). Most climate models project that sagebrush steppe will contract as mean temperatures increase and the frost line shifts northward

## USDA and Natural Resource Conservation

The Natural Resources Conservation Service (NRCS), originally formed as the Soil Conservation Service in response to the Dust Bowl, received a broader mandate and a name change in 1994 (P.L. 103-354). According to its Mission Statement, “NRCS improves the health of our Nation’s natural resources while sustaining and enhancing the productivity of American agriculture. We achieve this by providing voluntary assistance through strong partnerships with private landowners, managers, and communities to protect, restore, and enhance the lands and waters upon which people and the environment depend” (USDA-NRCS 2011). For this paper, “natural resources” refers to the resources that benefit from various NRCS programs, including soil, water, air, native fish, wildlife and plant species, and wetlands and other habitats.

(Blomberg et al. 2012; Neilson et al. 2005). In the worst case scenario, distribution of sagebrush species are simulated to diminish to just 20 percent of current distribution (Wisdom et al. 2005b: 206, *citing* Neilson et al. 2005).

Sagebrush steppe may also shift northward in response to increased temperatures (Schlaepfer et al. 2012; Shafer et al. 2001). Increased CO<sub>2</sub> may also favor invasive, annual grasses, including cheatgrass (Smith et al. 2000). Increased temperatures are also expected to dry out sagebrush steppe and may intensify the effects of other threats to sage-grouse, such as livestock grazing, invasive species and fire frequency and size (Aldridge et al. 2008; McKenzie et al. 2003; Baker 2011). Warming temperatures that result from climate change are expected to facilitate the spread of the *Culex* mosquito that carry West Nile virus (Gould and Higgs 2009). Periods of drought

may encourage the birds to congregate near water sources earlier in the year, increasing their exposure to the mosquitoes that spread the virus (Schrag et al. 2010).

Safeguarding sage-grouse and other natural and agricultural resources as the climate changes is a challenge that will require the collective vision and close collaboration of natural resource managers, federal, state, and local governments, conservation organizations, and private landowners across the United States (NFWPCAP 2012, Walthall et al. 2012). The Farm Bill conservation programs are a tool that can help build resilient agricultural systems and protect natural resources, biodiversity, and ecosystem services. These programs represent the single largest source of private land conservation funding in the United States, providing money for easements, wetland restoration, forest management, wildlife habitat creation and improvement, and other land management practices (Moore 2013).

Conservation programs have accomplished significant conservation success, but they are mostly being administered without consideration of how climate change will affect their ability to provide durable conservation benefits. For instance,

the foundational document describing NRCS's vision for the Sage Grouse Initiative never mentions climate change (USFWS-NRCS 2010). While the USDA is a leader among federal agencies in planning for the effects of climate change, the agency has mostly directed these efforts toward helping production agriculture maintain resilience to climate impacts and to reduce its greenhouse gas footprint. The USDA has not yet placed equivalent emphasis on adaptation measures to benefit natural resources, despite the mandate in Strategic Goal 2 of its 2010–2015 Strategic Plan: “Ensure Our National Forests and Private Working Lands Are Conserved, Restored, and Made More Resilient to Climate Change, While Enhancing Our Water Resources” (USDA 2010). To realize this goal, NRCS must more explicitly incorporate climate change into its conservation delivery. Attention to the Farm Bill conservation programs is needed to ensure these programs are making sound conservation investments, increasing the resilience of working lands and biodiversity, and helping to advance national policy goals such as those laid out in the National Fish, Wildlife and Plants Climate Adaptation Strategy.

Male Greater sage grouse in mating display, Clear Lake National Wildlife Refuge, California. Photo by Dave Menke, courtesy USFWS.





# Climate Change Adaptation and Farm Bill Conservation Programs

Climate change adaptation requires new ways of assessing information, new management tools and professional skills, increased collaboration across jurisdictions, and review of laws, regulations, and policies to ensure effectiveness in a changing world.

— National Fish, Wildlife and Plants Climate Adaptation Strategy, 2012.

## Principles of Climate Change Adaptation

Climate change adaptation involves active adjustment in management to reduce risk and take advantage of opportunities caused by a changing climate (Adger et al. 2007, Stein et al. 2014). Adaptation actions can be considered along a spectrum of resistance, resilience, and transformation, based on management intent (Millar et al. 2007). Management actions to shield an ecosystem or natural resource from the effects of climate change to maintain the status-quo are *resistance* strategies. These types of strategies include many site-specific and costly efforts such as coastal armoring to prevent inundation from sea level rise, or drilling for groundwater in agricultural areas where irrigation streams have run dry. *Resilience* strategies include efforts to help enable the system to be altered by a disturbance and return to its previous or similar condition. Typically proactive, these strategies might include removing invasive species to reduce the likelihood of them getting out of control after a fire or wind-throw, or diversifying on-farm crop production systems to prevent increasing pest damage as the climate changes (Walthall et al. 2012). Direct interventions that help the system shift towards a new, desirable condition as the climate changes are transformation strategies. These strategies may include proactively trans-locating wild species or developing novel agricultural cropping systems to keep pace with

changing conditions. Because these strategies require the highest level of intervention, *transformation* strategies carry significant risk and must be thoroughly evaluated.

Adaptation actions are best implemented as part of an adaptive management cycle that includes assessing the conservation target using tools such as vulnerability assessments, developing goals and strategies to achieve the desired target condition, implementing conservation actions, monitoring and evaluating actions, and adjusting management in response to results and continued input of new information (Stein et al. 2014). Adaptation strategies can be categorized in different ways or grouped according to established taxonomies of conservation practices. The National Fish, Wildlife and Plants Climate Adaptation Strategy (NFWPCAP 2012) provides a useful framework by grouping adaptation strategies for ecosystems and species based on the following goals:

1. Conserve and connect habitat to support healthy fish, wildlife, and plant populations and ecosystem functions;
2. Manage species and habitats for ecosystem functions and provide sustainable cultural, subsistence, recreational, and commercial use in a changing climate;
3. Enhance capacity for effective management in a changing climate;

4. Support adaptive management in a changing climate through integrated observation and monitoring and use of decision support tools;
5. Increase knowledge and information on impacts and responses of fish, wildlife, and plants;
6. Increase awareness and motivate action to safeguard fish, wildlife and plants;
7. Reduce non-climate stressors to help fish, wildlife, plants, and ecosystems adapt to a changing climate.

While many adaptation strategies will involve conservation practices we have implemented in the past, the process will be different because adaptation actions will be planned within the context of new climate conditions. Building resilience and adaptive capacity in natural systems may require us to reassess and adjust our conservation priorities, alter management practices, develop new practices, change the location of our conservation efforts, and work collaboratively with new partners. Reconsidering Farm Bill conservation programs will allow us to use these programs to address the goals outlined in the National Strategy to build resilient natural resources and wildlife species while increasing the adaptive capacity of working lands. The USDA has mainly focused on adaptation planning for agricultural resources, though there are examples of climate change adaptation for natural resources and wildlife already occurring in agricultural landscapes.

## Climate Change Adaptation Planning Within USDA

As the need to adapt to climate change has become broadly recognized, governments across the globe have responded by launching adaptation planning efforts and implementing new strategies to protect natural resources and human communities. The United States government planned for climate change adaptation with the creation of the Interagency Climate Change Adaptation Task Force in 2009. Executive Order 13514, signed by President Obama in October 2009, requires that all federal agencies develop recommendations for strengthening policies and programs in response to climate change. The USDA prepared a department-wide climate change vulnerability assessment and adaptation plan with agency-specific sub-plans, released in May of 2012.

The Natural Resource Conservation Services (NRCS) Cli-

mate Change Vulnerability Assessment and Adaptation Plan provides an initial assessment of the vulnerability of the agency and its mission, highlights potential impacts to agriculture and natural resources, and proposes high level guidance for developing adaptation actions. However, the plan lacks a discussion of the big-picture changes in strategic planning and program implementation that are a necessary component of climate change adaptation. While the plan notes the importance of re-evaluating conservation practices, it does not address how agency-wide goals, objectives, or priorities for farm bill conservation programs might change to reflect future climate scenarios. Nor does it suggest targeting program delivery to climate-sensitive landscapes or natural resources. We recommend that the agency work to develop a more structured strategic plan that pairs a comprehensive vulnerability assessment of the agency and the resources it manages with deliberately developed adaptation actions based on these threats. It should also reassess agency goals, priorities, and operating instructions under climate change. Such a plan should include details on how the farm bill conservation programs could best address climate change adaptation goals.

In 2012 the USDA produced *Technical Bulletin 1935: Climate Change and Agriculture in the United States: Effects and Adaptation* (Walthall et al. 2012). The authors offer a comprehensive overview of the direct and indirect effects of climate change on agriculture, key vulnerabilities, and adaptation strategies for different sectors of agricultural production. The report highlights the importance of conservation practices to counteract the impacts of increased soil erosion, the potential for increases in associated off-site, non-point source pollution, and losing other ecosystem services such as pollination. Importantly, the authors suggest that sustainable agricultural systems have the best chance of remaining resilient in the face of climate change. Missing from this report, however, is a detailed look at the role of Farm Bill conservation programs in advancing climate adaptation for terrestrial and aquatic ecosystems and wildlife; we hope that the USDA will produce a similarly structured report that outlines adaptation options for natural resources and provides recommendations for accomplishing adaptation goals through the Farm Bill conservation programs.

The newly created USDA Climate Hubs also have an important opportunity to guide the development of climate change adaptation strategies and Farm Bill conservation program delivery specifically. The Climate Hubs, announced in June 2013 and launched in February 2014, consist of seven regional and three subsidiary hubs for adaptation and mitiga-

tion for climate change. The charter for the hubs states they will “deliver science-based, practical information to farmers, ranchers, forest landowners, and resource managers to support decision-making related to mitigation of, and adaptation to climate change (USDA 2013).” The hubs will work at local and regional scales with multiple partners to enhance agricultural production, natural resource management, and rural economic development in the face of climate change (USDA 2013). As regional institutions, the hubs are well-positioned to compile the best locally scaled climate science, vulnerability assessments, and adaptation plans and to guide the adaptive management process as the climate changes. They should also facilitate the development of critical partnerships to implement the conservation programs more strategically.

### Balancing Adaptation Measures for Agricultural Systems and Natural Resources

Climate change adaptation efforts must attempt to build resilient agricultural systems and protect natural resources, including fish and wildlife, ecosystems, and the lands and water that support them. Agricultural and natural systems are inextricably linked: while adaptation for natural systems will support critical ecosystem services and resilient working lands, the management decisions made on these lands may not be favorable for wildlife or natural resources. Some practices are beneficial to both agriculture and wildlife in the face of climate change. Riparian buffers provide flood control for working lands and shade and nutrient retention to improve water quality for aquatic species. However, some adaptation strategies for agriculture are likely to negatively impact aquatic resources, compounding the damage from the direct effects of climate change (Walthall et al. 2012). Increased demand for irrigation water under drought conditions could stress ecosystems in many parts of the country. As the drought in California continues, deliveries of irrigation waters to farm fields will be reduced and farmers will increasingly drill for groundwater. While groundwater can help farmers to get through drought years, overdraft of this unregulated resource can lead to degraded water quality, land subsidence, reduced stream flow, harm to aquatic ecosystems, and impacts to wildlife that depend on these habitats. Similarly, some management activities to protect agricultural production under a changing climate, such as changing dates of planting, harvest and tillage, may increase the risk of erosion and lead to further impairment of aquatic ecosystems (Walthall et al. 2012). Considering natural resources throughout the management process will be critical.

The agricultural sector will likely respond to climate

change with an intensification of agriculture on existing acreage and an expansion of production onto new and potentially more sensitive acreage to make up for crop failures and food shortages around the world (Walthall et al. 2012). Expansion and intensification will cause increased water stress, land clearing, greenhouse gas emissions, and loss of wildlife habitat and ecosystem services (Malcolm et al. 2012). Expansion may be facilitated by crop insurance subsidies, which have encouraged farmers to plow up marginal lands like wetlands or prairie in the past, increasing the vulnerability of these lands to erosion, flooding, and drought (Faber et al. 2012). The 2014 Farm Bill enacted a Sodsaver provision limiting subsidies to cropland newly converted from grass, but the provision only applies in six states. Further, crop insurance may encourage farmers to till and plant their fields in drought years to get their payouts for crop failures. In the past, farmers might have let their fields lay fallow during drought years to avoid wasting seed and to rebuild soil fertility. Because crop insurance programs require that farmers plant seeds to receive insurance payments, fields are now tilled and planted even in heavy drought years when farmers are betting on failure (Townsend 2013). These policies will not help farmers adapt to climate change and will increase the vulnerability of natural resources and wildlife. While these maladaptive policies surely must be modified, Farm Bill conservation programs can make important contributions to climate change adaptation now by incentivizing the adoption of more sustainable agricultural policies to create resilient and productive agricultural and natural systems (Walthall et al. 2012).

### Climate Change Adaptation For Wildlife and Habitat in Agricultural Landscapes

Significant opportunities exist to use farm bill conservation programs to both increase the resilience of agricultural systems and to safeguard natural resources and biodiversity. Already, many conservation practices have been used to help mitigate climate change by sequestering carbon dioxide or reducing emissions. Farm Bill conservation programs can also conserve natural resources and protect biodiversity as the climate changes. While the NRCS has not yet developed national guidance for implementing climate change adaptation for wildlife and natural resources through farm bill conservation programs, there are examples of climate adaptation projects on working lands.

One such project is ongoing in California’s Central Valley, a major agricultural region that is also a key stopover for migratory birds on the Pacific flyway. Over 90 percent of

Central Valley wetlands and waterways the birds depend on have been drained or filled — in drought years there is often limited habitat for the birds to stop and feed as they fly north. The Nature Conservancy (TNC) has recently begun working with farmers to provide temporary stop-over habitat for migratory birds in drought years. TNC uses a mobile application called eBird, which collects bird sighting data from birders and citizen scientists to determine when different migratory species are passing through the Central Valley. Then they pay rice farmers to keep their rice fields flooded longer than they normally would; these fields become temporary wetlands for migrating birds. Farmers place bids based on the projected costs of keeping their fields underwater longer — putting off harvest and increasing personal risk — and TNC accepts the best bids to keep rice fields wet during the spring migration. This flexible approach provides critical habitat for migratory birds when they need it most, does not carry the sometimes

prohibitive cost of permanent land conservation, and keeps the acres in use as productive farmland. In April, once the migration is complete, the fields are left to dry and the farmers go back to work (Sommer 2014, Robbins 2014). Conservation programs such as the Environmental Quality Incentives Program (EQIP) or the Conservation Stewardship Program (CSP) could easily adopt a similar approach, paying farmers to provide temporary habitat to a range of migratory and non-migratory species based on changing climate conditions.

Climate change will significantly increase the need for conservation interventions, stretching already limited conservation funding. To meet this demand, programs should be targeted to where they are needed most. NRCS already engages in targeting of conservation programs to a significant degree (See “*Targeting of Farm Bill Conservation Programs*,” Defenders of Wildlife 2014c).

A flock of geese flying off a flooded rice field in Northern California. Courtesy NRCS.



# RECOMMENDATIONS FOR BETTER INCORPORATION OF CLIMATE CHANGE ADAPTATION INTO FARM BILL PROGRAM DELIVERY

A climate-ready U.S. agricultural system will depend on easy access to useable climate knowledge, improved climate risk management strategies, effective adaptation planning and assessment methods, and the development of more resilient production systems.

— Walthall et al. 2012, *Climate Change and Agriculture in the United States: Effects and Adaptation*.

## 2014 Farm Bill

The Farm Bill signed into law by President Obama on February 7, 2014 (P.L. 113-79, The Agricultural Act of 2014; hereafter called “the 2014 Farm Bill”) authorizes a variety of conservation programs that provide technical and financial assistance to encourage private agricultural and forestry landowners to improve soil, water, air, and habitat quality on their land. The 2014 Farm Bill consolidated similar existing programs to streamline conservation delivery, but cut \$4 billion over 10 years from the overall conservation spending budget – an amount that increases to \$6.1 billion under the automatic cuts to conservation in the upcoming sequestration process (NSAC 2014).

The two main categories of farm bill programs are easement programs and working lands programs. Easement and land retirement programs, including the Conservation Reserve Program (CRP), the Healthy Forest Reserve Program (HFRP) and the newly consolidated Agricultural Conservation Easement Program (ACEP), take land out of production temporarily, or permanently protect and restore working farmland, forestland, grassland and wetland habitat. The working lands programs, the Conservation Stewardship Program (CSP) and Environmental Quality Incentives Program (EQIP) support the adoption of resource conserving practices as part of an on-farm conservation stewardship plan. Finally,

an amalgamation of several former programs aimed at addressing priority conservation issues through partnerships, the Regional Conservation Partnership Program (RCPP), encourages collaborative efforts to address long-term conservation challenges. For a full review of program changes in the 2014 Farm Bill, including the consolidation and repeal of certain historically important programs, see “A Guide to the Farm Bill Conservation Programs,” (Defenders of Wildlife 2014a).

The conservation programs available through the new Farm Bill represent the largest source of funding for protecting wildlife habitat and natural resources on private lands. However, declining budgets, continued expansion and intensification of agricultural production, and the ongoing impacts of climate change require us to implement these programs strategically to maximize benefits. Proposed adaptation strategies for the agricultural sector have broadly included development of sustainable agricultural systems, strengthening climate sensitive assets, promoting approaches that encourage adaptive management and climate-learning, integrating adaptation into all relevant government policies, and addressing non-climate stressors to make resources more resilient to climate change (reviewed in Walthall et al. 2012). Below we offer broad and program-specific recommendations for implementation of the 2014 Farm Bill conservation programs that will cause measurable environmental benefits and help to safeguard wildlife, natural resources, and agricultural producers from the impacts of climate change.

### ***1. Use scale-appropriate science and planning tools to incorporate climate change into program delivery***

All current and future planning, prioritization, and funding allocations associated with conservation program delivery should utilize the best climate change science. Vulnerability assessments of natural resources, species, and habitats should be incorporated into the development of national and state program priorities, allocation of state and local funding pools, and application of ranking factors for project selection. Conservation program manuals and plans should be revised to address how climate change may affect program delivery and indicate how conservation practices can best help species and natural resources adapt. Existing program structures should be reviewed to identify ways to encourage producers to build more resilient agricultural systems while sustaining the integrity of natural resources, habitats, and ecosystems (NFWPCAP 2012). Key documents that must be revised include:

1. All Farm Bill conservation program technical manuals;
2. NRCS 5 Year Strategic Plan for Fiscal Years 2011-2015 (NRCS 2011c);
3. The NRCS *National Planning Procedures Handbook* (NRCS 2003);
4. The NRCS *National Biology Handbook* (USDA 2004);
5. On-farm conservation plans completed with the help of NRCS agents for managing natural resources and implementing conservation programs.

While incorporating climate change into program delivery will require a significant time commitment, this undertaking can draw on the rapidly expanding availability of climate change adaptation planning tools, guidance, and state and regional plans. As of 2012 all but 16 states had or were in the process of incorporating climate change into their State Wildlife Action Plans (AFWA 2012). Federal agencies that manage fish and wildlife as well as regional climate change initiatives such as the USGS Climate Science Centers are studying climate impacts, drafting plans, designing planning tools, and developing guidance that can help NRCS revise their own programs. The recent launch of the USDA Climate Hubs may offer another source of support. These hubs should supply information, develop planning and decision-making tools, and compile regionally specific guidance to help Farm

Bill conservation programs better integrate climate change into program delivery. We recommend that the Hubs work with partners to develop regionally based stand-alone climate adaptation plans for agriculture and natural resources. Specialized sub-committees of the State Technical Committees, staffed with knowledgeable individuals and stakeholders tasked with incorporating climate change adaptation into program delivery could also be created in every state to address climate change adaptation.

### ***2. Work collaboratively to increase the pace of land conservation***

Safeguarding wildlife and natural resources will require the conservation of an ecologically connected network of lands and waters to allow species to shift their ranges across the landscape (NFWPCAP 2012). Such a network will require conservation on both public and private lands, and as the leading source of private lands conservation funding, the Farm Bill has a critical role to play in building this network. The USDA should work with partners in specific landscapes to develop strategic conservation plans that identify the lands most important to conserve, and implement the best management practices to protect species and natural resources under climate change. Existing efforts such as the State Wildlife Action Plans, regional landscape planning forums including the U.S. Fish and Wildlife Service's Landscape Conservation Cooperatives, and targeted efforts like the Sage Grouse Initiative and Working Lands for Wildlife provide opportunities for this coordination. The Regional Conservation Partnership Program (RCPP) is well suited to implement conservation actions resulting from collaborative planning efforts and should target conservation funding towards partnerships that address climate change adaptation in specific landscapes. RCPP could target easements or habitat improvements to areas that research partners have identified as climate refugia or as important areas for connectivity. It is crucial that selection of national, state, and regional priorities for the RCPP be completed with climate change as one of the considerations.

There are also opportunities for NRCS to take advantage of relationships with partners to improve conservation delivery. Federal and state agencies or non-profit organizations may have funding for development of climate change adaptation plans to guide the delivery of conservation resources. NRCS can utilize the planning knowledge and resources of these partners, while also providing input to ensure that plans address challenges and opportunities for working lands as the climate changes. NRCS can also use partners to help with

outreach. Targeting conservation programs to strategic locations requires convincing landowners who hold the land in these target areas to enroll. Historically, budget deficits have reduced staff available to conduct outreach to landowners. Land trusts and other local partners can fill this gap and conduct highly effective outreach through existing relationships with landowners.

### ***3. Build resilience in agricultural and natural systems by supporting ecosystem services***

Ecosystems and the biodiversity they support provide a huge variety of beneficial services to agriculture and human communities including air and water purification, carbon sequestration, pollination, and flood control. These ecosystem services can buffer working lands from some of the impacts of climate change and can reduce the number of management interventions required by producers. As ecosystem services have been lost due to land use and human degradation, we have often tried to replace them with costly infrastructure and interventions. For instance, levees and dams have been built to re-direct water and control flooding, pesticides are sprayed to control harmful pests in monoculture fields that lack beneficial insect predators, and expensive fertilizers are applied to replace the nutrients lost by harvesting year after year rather than managing the soil through crop rotation.

In a warming world, we will increasingly rely on ecosystem services to support crop production and human communities and we should guard against actions that further damage natural systems and the services they provide. As temperatures rise, agricultural pests will become more problematic and producers may respond by increasing pesticide use. This intervention would come at great cost, as pesticides cost producers money, degrade wildlife habitat, harm pollinators, and reduce water quality at a time when water availability continues to shrink. Conversely, crop diversification and management of biodiversity across the entire landscape to reduce pest outbreaks is a strategy that can increase the resilience of agricultural production, benefit natural resources, and likely cost less to implement (Walthall et al. 2012).

Natural landscapes provide multiple ecosystem services simultaneously and are more efficient than replacement technologies engineered by people. Conservation programs, therefore, make more efficient use of taxpayer dollars when they help landowners maintain and enhance ecosystem services, rather than replacing these services with costly human infrastructure. Unfortunately, this was not always the preferred approach. Between 1997 and 2010, over 70 percent of

EQIP program dollars went towards structures designed to deal with environmental issues like wastewater management, but limited in their provision of other environmental benefits. Some of these were on large animal feedlots (EWG 2013), where these systems risk catastrophic failure-- a risk exacerbated by climate change and the attendant increase in severe storms. While it is essential to mitigate environmental pollution coming from these operations, large-scale polluters should pay the cost for their damage, rather than using limited conservation program dollars on systems that could worsen pollution in the long run. Similarly, instead of paying for installation of flood control structures, programs such as the Agricultural Conservation Easement Program (ACEP) could create easements on floodplains adjacent to agricultural fields to protect these fields from increased flooding. This land will help to reduce pollution entering rivers and streams, enhance groundwater storage, increase carbon sequestration, and provide habitat to sensitive wildlife species. Conservation programs should strive to promote conservation and holistic management of working lands to protect ecosystem services, rather than funding measures that replace these services with technology.

### ***4. Target conservation program delivery to areas and priorities where it will have the greatest impact***

The threat to natural resources and wildlife from climate change coupled with ongoing reductions in conservation spending underscores the importance of using funding strategically. Further, the need to demonstrate results when spending public tax dollars has perhaps never been more important than in our current political climate. For Farm Bill conservation programs to be most effective they need to be implemented as part of a conservation plan that identifies the most important locations or priorities for conservation based on conservation need, climate change vulnerabilities, opportunities to partner and leverage funding, and the potential for conservation actions to result in positive outcomes. Targeting conservation program delivery has taken place in the Prairie Pothole region where models were developed to identify areas where Conservation Reserve Program cover practices would provide the greatest benefits to duck conservation. Results showed that while 75 percent of active CRP contracts were in areas accessible to high or medium numbers of ducks, 25 percent were in areas of low duck populations that are not as useful for boosting population numbers. These findings led to a modification of the USDA's Environmental Benefits Index for ranking CRP applications, and the creation of the CRP Duck

Nesting Habitat Initiative that restores wetland habitats in landscapes most suitable for nesting waterfowl (reviewed in Gleason et al. 2011). Similar efforts, using species-specific models, climate vulnerability assessments, and spatial mapping to guide conservation delivery will help target limited funding to the landscapes where it will produce the best results. Working with partners to leverage funding in priority landscapes will also help increase the pace of wildlife and natural resource protection.

### ***5. Evaluate effects of conservation program delivery to improve conservation outcomes and allow flexibility to course correct as needed***

Climate change requires us to continually learn from and improve conservation actions as part of an adaptive management cycle. A key component of this model is assessing the effectiveness of current conservation practices and adaptation strategies. The Conservation Effects Assessment Program (CEAP), created in 2003, provides an important opportunity to monitor and learn from past program implementation. CEAP works to link conservation efforts to environmental outcomes, helping to ensure the success of these programs in meeting their environmental goals (NRCS undated-e). Going forward, monitoring efforts through the CEAP program should be expanded and improved to manage more adaptively. To encourage innovation and produce the best environmental results, monitoring should focus on outcome-based measurements (such as improvement in water quality), rather than the number of practices implemented. Quantifying the value of ecosystem services produced through conservation programs would allow these results to be better communicated with policy-makers and the public, and incorporated into agricultural decision-making. Data from monitoring programs should be spatially explicit, easily accessible, and publicly available to be readily incorporated into the adaptive management cycle.

Increased flexibility in program implementation should allow landowners to alter conservation practices as monitoring results are interpreted and new information becomes available. The Managers Statement (U.S. House 2014) on the Conservation Stewardship Program (CSP) notes that an agricultural operation may “make adjustments in production systems in response to the changing markets, weather-related causes or other necessary actions essential to continuing their operation.” They ask the secretary to ensure that producers can adjust their operations while maintaining conservation performance (U.S. House 2014). This guidance is critical to

the success of adaptive conservation program delivery; flexibility to improve management responses should be incorporated into all conservation programs. One option for increasing flexibility in program delivery is to allow for a portion of conservation program dollars to pay for outcomes; that is, by rewarding landowners for actual delivery of the expected benefits, in addition to paying for implementation of practices. This idea is explored in the publication “*Payments for Wildlife and Biodiversity Outcomes Under Farm Bill Programs*” (Defenders of Wildlife 2014b).

### ***6. Ensure that adaptation and mitigation practices are complementary***

Through conservation programs and management practices, the agriculture sector has the potential to build the adaptive capacity of natural resources and slow climate change through climate mitigation. As opportunities in both areas are pursued, the agricultural sector must develop a coherent climate policy to ensure that mitigation efforts do not adversely affect sensitive natural resources, and to identify potential synergies between mitigation and adaptation goals (Walthall et al. 2012). Some practices, such as planting perennial cover on retired crop fields, can accomplish both adaptation and mitigation goals. As soil erosion increases because of heavier rainfall events, perennial cover crops can reduce erosion, sedimentation, and pollution into nearby streams and aquatic systems improving soil health and wildlife habitat. Perennial cover crops help to sequester more carbon in the soil, reducing on-farm greenhouse gas (GHG) emissions. There are many opportunities to implement complementary adaptation and mitigation strategies, but care should be taken to ensure these measures do not work at cross purposes. Provisions in the CRP allow producers to install clean energy technologies such as windmills on retired lands. While these technologies help to reduce GHG emissions and mitigate climate change, they should be sited appropriately to ensure they are not creating additional stress for sensitive wildlife or natural resources.

### ***7. Enhance capacity for effective program delivery that addresses the challenges from climate change***

Conservation program delivery to meet climate change adaptation goals requires significant resources to facilitate planning, adaptive management, and strategic implementation. Already, funding reductions in the 2014 Farm Bill, coupled with impending cuts from the federal budget sequester, will cause a loss of over \$6 billion in conservation program funding over the life of the bill. Further, the need to



adaptively manage conservation practices at the farm scale will require more effort from producers and increased technical assistance from NRCS field agents. It is essential that conservation programs and associated technical assistance and assessment programs (such as CEAP) are not further reduced through federal appropriations or changes in mandatory program spending.

To ensure climate change adaptation is delivered through conservation programs, NRCS staff, independent technical service providers, and landowners will require training in climate change science and access to tools that enable planning and delivery of conservation practices under climate change. In Australia and Canada, farmers use tools designed to help select and monitor the effects of sustainable practices on the adaptive capacity of their system (Walthall et al. 2012). These tools are in development for production agriculture in the U.S. which will allow producers to identify ongoing issues, develop strategies to address challenges, monitor the effect of different conservation practices, and take ownership of the results achieved through various conservation practices. Developing similar tools and education programs to help producers manage resilient working lands and natural resources will be a critical component of climate change adaptation efforts, and the new climate hubs should make this development a priority.

### ***8. Motivate landowners to implement climate-smart conservation practices***

For Farm Bill conservation programs to be implemented successfully, landowners must understand the importance of managing resilient working farm and forestland to protect natural resources. To motivate action and adoption of conservation programs, NRCS should work to increase awareness of the threats to agriculture and natural resources from climate change, and engage landowners and other stakeholders in helping to develop strong policies and implementation strategies for conservation programs. Outreach efforts should encourage landowners to use holistic, sustainable practices that support ecosystem services, rather than relying on technology and infrastructure to remediate environmental damage. NRCS should focus outreach efforts in landscapes identified as targets for conservation funding. They should promote past conservation program success locally and at the national level, incorporate feedback from landowners into program refinement as part of the adaptive management cycle, and rely on local partners, including land trusts and other conservation organizations, to help share information about their programs and inspire landowners to enroll.

A strip of native grass combines with rows of shrubs and trees to form a protective riparian buffer along Bear Creek in Story County, Iowa. Photo by Lynn Betts, courtesy NRCS.



# PROGRAM-SPECIFIC RECOMMENDATIONS

## Conservation Reserve Program (CRP)

The Conservation Reserve Program, the largest and oldest of the Farm Bill programs, pays producers who remove highly erodible or other sensitive lands from production. Conservation practices implemented through the CRP program include planting conservation cover, managing upland wildlife habitat, creating filter strips, conducting pest management, and completing wetland restoration. CRP contracts last 10-15 years, and are administered by the Farm Service Agency with NRCS providing technical support. The 2014 Farm Bill reduced CRP acreage from 32 million acres to a maximum of 24 million acres, and made expiring contract acres eligible for priority enrollment in other conservation programs such as CSP. CRP has also been amended to include rental payments for lands similar to those in the previous Grassland Reserve Program (CRS 2014).

The Conservation Reserve Program has obvious benefits for climate mitigation – in 2012 land conserved through the CRP sequestered as much carbon as taking nine million cars off the road (USDA 2013). Used strategically, the program can also help wildlife adapt to climate change and support ecosystem service production. In a single year, 31.3 million acres of CRP land kept 220 million tons of sediment out of rivers and streams, reducing nitrogen runoff by 607 million pounds (FSA 2011). CRP has also created valuable wildlife habitat and has been credited with increasing duck production in the Prairie Pothole Region by 30 percent (Reynolds et al. 2001). As flooding and droughts become more common under climate change, practices installed through CRP can reduce erosion, sedimentation, and nutrient pollution. Targeted towards protection of large blocks of land, CRP can restore functionally connected landscapes for wildlife and provide critical ecosystem services such as water storage (Gleason et al. 2011). CRP land can connect larger blocks of intact habitat to allow species to move to new habitat as the climate changes and may also facilitate the flow of ecosystem services onto the farm. Pollinator richness and visitation rates have been shown

to decline significantly as distance from natural habitat increases (Ricketts et al. 2011), and CRP enrollment on marginal lands increases organic soils on productive acres and reduces soil and nutrient losses throughout the farm (FAPRI-UMC 2007). We offer the following recommendations to help CRP address climate change adaptation:

1. Application ranking is based on the Environmental Benefits Index (EBI) administered through the Farm Services Agency. The EBI should be updated so it can deliver strategic conservation results and to include climate change considerations. The 2013 EBI includes a Wildlife Factor for ranking the expected wildlife benefits of proposed CRP lands including Wildlife Habitat Cover Benefits, Wildlife Enhancement actions, and Wildlife Priority Zones. Ranking wildlife habitat cover benefits in the future should ensure these cover types will be beneficial to wildlife as the climate changes. Similarly, the identification of Wildlife Priority Zones should include information about climate change impacts to species and natural resources in order to protect areas that will allow climate-sensitive resources to adapt. These Priority Zones could include locations with state or locally identified sensitive habitats, areas with the potential to increase landscape connectivity (such as areas closest to protected lands), or areas with high concentrations of existing conservation activities on working lands. Landscape-scale habitat models could also target program delivery to locations where CRP practices could provide the greatest benefit to species of interest (Gleason et al. 2011).
2. The CRP program manual should be updated to include information about climate impacts, key vulnerabilities, and potential adaptation strategies that could be implemented through the program.

3. All practices allowed under CRP should be evaluated by the state technical committee and state conservationist with support from the Climate Hubs to ensure that they do not damage species and natural resources as the climate changes. New practices to increase natural resource and wildlife resilience to climate change should be considered.
4. As authorized, the program deletes existing priority areas for CRP implementation in the Chesapeake Bay Region, the Great Lakes Region, and the Long Island Sound, but allows USDA to set new priority areas for funding (Section 1231(f)). In developing new priority areas the Secretary should consider locations likely to experience significant impacts from climate change, and areas prioritized through other conservation initiatives. Before priorities are designated there should be an open comment period to allow public participation in the priority setting process. Similarly, areas targeted for Continuous CRP and agreements with states for the Conservation Enhancement Reserve Program (CREP) enrollment should consider the impact of climate change on wildlife and natural resources and should invite public comment. Continuous CRP practices, such as the State Acres for Wildlife Enhancement Program (SAFE) have been used to support endangered species and wildlife habitat in the past and should continue to meet this important demand.
5. Approval of wind turbines, grazing, harvesting, fencing and other human modifications on CRP land permitted through Section 2004 of current law should be carefully considered for negative impacts to sensitive species or natural resources. Vulnerability of these species or resources to climate change should be considered when making management decisions.
6. Guidance should be developed to avoid creating “disturbance corridors,” with CRP land intended to provide connectivity for biodiversity and ecosystem services. Native wildlife and plants move best through corridors that closely resemble intact habitat and have limited “edge-effects.” Narrow, linear patches along farm fields or roads often suffer from significant edge-effects such as increased light, soil disturbance, predation, and invasion from non-native plants or agricultural weeds, compromising their conservation value. Conservation actions through CRP and other land protection programs should focus on pro-

tecting intact areas that connect habitat and are of sufficient size to best allow native species to move freely through the landscape.

7. As with other programs, NRCS should encourage the use of adaptive management for CRP implementation, allowing producers to alter conservation practices as new information becomes available.

## Agricultural Conservation Easement Program (ACEP)

The Agricultural Conservation Easement Program (ACEP) is a new program created through the 2014 Farm Bill that combines the purposes of the former Grassland Reserve Program (GRP), Wetland Reserve Program (WRP), and Farm and Ranchland Protection Program (FRPP) to provide a joint funding pool for the creation of wetland, grassland, and farmland easements. ACEP includes the option to enroll in a Wetland Reserve Easement or an Agricultural Land Easement. Through the Wetland Reserve Easement option the USDA will pay landowners for 100 percent of the easement value of permanent easements and up to 75-100 percent of the cost of restoration, or 50-75 percent of the easement value and 50-75 percent of the restoration costs for a 30 year easement. ACEP also retains the Wetlands Reserve Enhancement Program that leverages partnerships formed by agreements between USDA and states, municipalities, tribes or NGOs to restore priority wetland areas.

As species shift their ranges in response to climate change, protecting a broad network of conservation lands is essential. Because each species will respond individually to climate change it is hard to predict the habitat types we need to protect. Conserving a diversity of landscape features and habitat types now and enhancing connectivity will provide species with the best opportunity for finding suitable conditions somewhere (NFWPCAP 2013). The ACEP program can strategically protect working lands and habitat and strengthen our national conservation network as the climate changes. Conservation partners are already implementing this proactive farmland conservation in the Pacific Northwest. Working in estuaries, Ducks Unlimited is acquiring easements on farmland adjacent to coastal wetlands. In the future these lands will act as wetland “right-of-ways,” allowing marshes to migrate inland as sea levels rise. Agricultural lands, which have not been hardened by development of infrastructure are suitable to serve as future areas for wetlands (National Fish, Wildlife and Plants Climate Adaptation Task Force 2013).

We offer the following recommendations for the ACEP program:

1. Each state implementing ACEP should complete detailed, state or regional-scale mapping that identifies target locations for easement funding. Priority locations for easement enrollment should include the following factors:
  - Lands important for wildlife, as identified by regional or local conservation partners and agencies (e.g. Conservation Opportunity Areas or other priority areas identified through state wildlife action plans);
  - Lands that provide critical ecosystem services such as floodplains, mangroves, or riparian forests that help to prevent flooding, increase water storage and build resilience as the climate changes;
  - Lands near large protected areas that provide landscape connectivity or serve as buffers to protect habitat from human impacts while facilitating the flow of ecosystem services from natural lands to agricultural systems
2. Eligible lands should include all riparian areas, not just riparian areas that “link” protected wetlands as outlined in section 1265A (3)(B)(iv) of the 2014 Farm Bill (P.L. 113-79). Riparian areas will be increasingly valuable for supporting wildlife and ecosystem services such as flood control and water purification. Excluding most riparian areas from program funding overlooks an opportunity to protect important wildlife habitat and water resources, especially in places like the arid Southwest where riparian areas are some of the only wetland habitat available.
3. Section 1265C of the 2014 Farm Bill outlines the process for evaluating and ranking offers for Wetland Easements to maximize the benefit of federal investment under the program. Ranking criteria should incorporate climate change information and specifically give priority to sensitive habitat areas that have been identified by state, federal or local conservation plans such as the State Wildlife Action Plans. Easement applicants should be evaluated based on their potential to build landscape resilience for climate change. An easement offered within a floodplain might score higher than an easement offered on a small forest remnant surrounded by row crops.
4. Section 1265C (f) requires the Secretary to develop a wetland reserve easement plan for land subject to a wetland reserve easement. These plans “shall include practices and activities necessary to restore, protect, enhance, and maintain the enrolled land.” Plans should reference potential impacts from climate change and develop adaptation strategies that can be delivered through the program.
5. There are no acreage requirements or goals for the division of funding among wetland, grassland and farmland easements. Guidance on this should be provided at the state level and flexibility should enable funding to go to the most important overall applications based on the detailed state level ACEP plan described above.
6. Thirty-year contracts available through ACEP should be used strategically as “rolling easements,” to provide increased flexibility under climate change. There is risk that climate change impacts will alter habitat or natural resource values protected on permanent easements rendering these protected lands less valuable (or making some more valuable). For example, thirty-year easements provide a flexible conservation approach that allows for adjustment as climate change impacts are realized locally. A producer enrolls a section of coastal wetland on their farm in a 30-year contract. At the 25 year mark much of the land has been permanently inundated by sea level rise and no longer provides the wildlife habitat benefits or ecosystem services it was originally protected to produce. At the 30-year mark the contract expires and the producer’s heir re-enrolls adjacent wetland and upland habitat, further inland, in a 30-year contract hoping to create additional wetland habitat and replacing the values lost on the submerged land. To encourage this flexible conservation approach, applications for 30-year contracts that offer a commitment to consider re-enrollment of the same or similar land at contract expiration should be prioritized.

## Regional Conservation Partnership Program (RCPP)

Recent emphasis on the importance of partnerships working together to solve intractable environmental problems led to the creation in the 2008 Farm Bill (P.L. 110-246) of a handful of collaborative, spatially targeted initiatives focusing on areas like the Chesapeake Bay and Great Lakes. The 2014 Farm Bill consolidates these programs into the RCPP, funded

at \$100 million per year, with an additional 7 percent of the funds and acres allocated under the EQIP, ACEP, CSP, and HFRP programs. Funding is divided such that 25 percent can go to State Priorities, 40 percent to national priorities, and 35 percent to projects in up to eight designated USDA “critical conservation areas.” Critical conservation areas must include multiple states, encompass significant agricultural production, have water quality issues under management plans or agreements, and contain areas which could benefit from improvements to water and nutrient management (Defenders 2014c). This program is likely to address, among other priorities, the issues covered in former partnership programs, such as the Chesapeake Bay Watershed program, the Great Lakes Basin Program, and the Cooperative Conservation Partnership Initiative, all of which have been repealed.

With its emphasis on bringing together multiple partners to address state, regional, and national priorities, the RCPP offers perhaps the best opportunity to implement strategic conservation actions in targeted landscapes to increase the resilience and adaptive capacity of working lands, wildlife and natural resources to climate change. The program should be targeted towards climate sensitive areas, such as the Chesapeake Bay, where existing land use stressors and climate change will challenge agricultural production and natural resources. In the Bay, the RCPP could protect land adjacent to coastal wetlands to allow for wetland migration in a region where coastal wetland subsidence and inundation is already widespread. The RCPP could also pay producers to install practices that prevent erosion and nutrient runoff into the waters of the Bay where warmer ocean temperatures are likely to increase harmful algal blooms. The RCPP should develop partnerships in focused landscapes to deliver targeted conservation actions that build resilience as the climate changes.

1. Section 1271A of the 2014 Farm Bill outlines eligible activities for the program, including water quality restoration and enhancement, water quantity conservation, drought mitigation, flood prevention, water retention, air quality improvement, habitat conservation, restoration and enhancement, erosion control, forest restoration and other related activities determined by the Secretary. The secretary should make it clear that climate change adaptation strategies for natural resources and wildlife are an eligible practice for this program and should prioritize applications that seek to develop and implement such practices.
2. Contributions from partners under the RCPP are expected to provide a “significant portion of the overall costs of the scope of the project (Section 1271B (2)).” We concur with the Managers Statement guidance (U.S. 2014) urging the Secretary not to define this contribution as a set percentage of costs but to evaluate the “overall merits of each proposal and the significance of the partner’s contribution to the potential successful implementation.” Partners may have limited funds but may contribute significant technical assistance and knowledge, particularly related to emerging conservation issues like climate change adaptation.
3. Section 1271B (d)(2) states that the Secretary shall make public criteria used in evaluating applications. We suggest there be a designated comment period for establishing criteria, and those criteria include the potential to address conservation issues arising from climate change.
4. Section 1271B (4)(D) allows the Secretary to give higher priority to applications that deliver “high percentages of applied conservation to address conservation priorities or regional, State, or national conservation initiatives,” among other considerations. We suggest that the Secretary should encourage applications that help to implement climate adaptation plans, and State Wildlife Action Plans or other plans targeted to specific geographic areas.
5. Section 1271B (4)(E) gives the Secretary authority to prioritize applications that provide innovative methods for conservation program delivery including outcome-based performance measures. We recommend that the Secretary encourage applications that implement climate change adaptation strategies and measure the success of these strategies by quantifying changes in ecosystem services and/or indicators of wildlife health.
6. Section 1271F allows the Secretary to select applications for partnership agreements designated by the Secretary within critical conservation areas and lists criteria for priority designation including: states with significant agricultural production, areas covered by an existing plan, and areas that would benefit from water quantity or quality improvement, and contains producers that need assistance in meeting or avoiding the need for a natural resource regulatory requirement. We believe conservation goals for wildlife and natural resources have not received

adequate representation in this section and that they should be considered in designating critical conservation areas. Further, these areas should include landscapes that have regional plans in place for climate change adaptation, or harbor wildlife species likely to be impacted by climate change.

### Healthy Forest Reserve Program (HFRP)

The Healthy Forest Reserve Program (authorized under the Forestry Title of the Farm Bill) provides financial assistance to private landowners and tribes wishing to protect forest resources through 10-year restoration agreements and 30-year or permanent easements. The program addresses endangered or threatened species recovery efforts, to improve plant and animal biodiversity, and to enhance carbon sequestration (NRCS, undated-b). Hunting and fishing, managed timber harvests or periodic haying and grazing are allowed on HFRP easements if they are compatible with conservation goals (Weldon et al. 2010). The program is available only in Arkansas, California, Georgia, Indiana, Kentucky, Maine, Michigan, Mississippi, Ohio, Oklahoma, Oregon, Pennsylvania, and South Carolina (NRCS, undated-c). Recognizing increased interest in the program, the 2014 Farm Bill replaces the \$9.75 million per year in mandatory funding with an authorized \$12 million per year subject to annual appropriations (U.S. House 2014) but otherwise does not alter the program.

The HFRP is already designed to prioritize climate change mitigation goals and can easily address climate change adaptation concerns for wildlife and natural resources through its focus on biodiversity and endangered species. Proposed priority areas for HFRP implementation are developed by the state conservationists, with input from State Technical Committees or other organizations. Applications are solicited and ranked by the NRCS chief and top-ranked areas receive funding which is then distributed to landowner applicants based on the criteria above. Both the selection of funding areas and the prioritization of landowner applications should include climate change adaptation criteria to target funds towards wildlife and forest resources threatened by climate change. Projects should be implemented in a targeted fashion to create large areas of resilient forest habitat.

We offer the following recommendations for HFRP implementation:

1. Program manuals should be updated to include information about climate change adaptation.

2. Forest stewardship plans, required by landowners implementing HFRP practices, should address localized impacts of climate change and propose climate adaptation strategies. Plans should allow flexibility to implement conservation actions through adaptive management, refining as necessary to deliver the best conservation outcomes.

### Environmental Quality Incentives Program (EQIP/WHIP)

The Environmental Incentives Program (EQIP) was authorized in the 1996 Farm Bill with the broad goals of providing farmers and ranchers with technical assistance, helping producers comply with environmental laws, and addressing the most serious threats to soil, water, and related natural resources (P.L. 104-127). Priorities since the 2008 Farm Bill are impaired water quality, conservation of ground and surface water resources, improvement of air quality, reduction of soil erosion and sedimentation, and improvement or creation of wildlife habitat for at-risk species (NRCS undated-d). The 2014 Farm Bill rolled the purposes and practices of the Wildlife Habitat Incentives Program (WHIP) into the EQIP program and requires that at least 5 percent of EQIP funds be used for practices benefiting wildlife habitat (Defenders 2014a).

We urge NRCS to use the EQIP program to build resilient agricultural and natural landscapes, and to address vulnerabilities of natural resources and wildlife to climate change. EQIP will have the greatest benefit when used in a targeted fashion to support delivery of ecosystem services through active farm stewardship. In the past, a substantial portion of EQIP funding has gone towards expensive infrastructure projects such as wastewater treatment facilities and irrigation systems instead of towards land management practices such as conservation tillage, cover cropping, and filter strips (EWG 2013). In an analysis of the EQIP program in California, the Environmental Working Group found that only 11 percent of funding for practices that reduce nutrient pollution goes towards vegetation management practices. These practices, such as precision conservation and cover cropping, are more efficient at reducing nutrient pollution and deliver additional ecological benefits such as water and soil conservation (EWG 2013). Instead of relying on costly engineered infrastructure and intervention, the EQIP program should help producers manage their working lands and natural resources sustainably. Through the Conservation Innovation Grants sub-program, EQIP should also test new,

innovative practices that can help farms and the wildlife habitat they support become more resilient as the climate changes. We offer the following recommendations for strengthening the EQIP program and incorporating climate change adaptation into program delivery:

1. The balance of EQIP funding should go towards practices that harness the power of land stewardship and resource conservation to deliver ecosystem services such as water storage, flood control, nutrient retention, and pollination, and build resilience in agricultural and natural systems. These kinds of practices offer important co-benefits, like improvement of soil quality and storage of soil carbon, and can help buffer human communities and wildlife habitats from the effects of extreme weather (Defenders 2012). We recommend that:
  - The EQIP ranking system should assign higher points to comprehensive management and vegetative practices (e.g. cover cropping) and lower points to practices that install infrastructure (e.g. waste management treatment systems).
  - Outreach, education, and planning guidance should be provided to producers to encourage them to adopt these types of practices.
  - Caps should be established for cost-share payments for infrastructure projects such as waste treatment systems and higher cost share payments should be allowed for practices that focus on holistic, integrated crop management approaches (EWG 2013).
2. Section 2203(f) on allocation of funding under EQIP specifies that at least 5 percent of funding must be allocated to practices benefitting wildlife habitat. Because of the significant challenges to wildlife under climate change and the key role that conservation practices will have in improving habitats and building resilience, we urge the secretary to dedicate a higher percentage of EQIP funding for wildlife habitat activities as the program is implemented.
3. States should retain and update state-wide conservation plans that guided past implementation of the WHIP program. These plans contain valuable information about threats to wildlife, priority resources, and conservation

strategies, while also providing an opportunity to build partnerships with state natural resource agencies and conservation organizations. State WHIP plans can help to strategically allocate the limited percentage of EQIP funding to the most critical wildlife issues facing each state. WHIP plans should incorporate climate change impacts and vulnerabilities.

4. Section 2203(g) of the 2014 Farm Bill states that the Secretary shall consult with State Technical Committee (STC) not less than once per year to determine the wildlife practices eligible for funding under the program. STCs should continue to evaluate and refine program practices based on climate change information, adaptive management, and new planning and should be encouraged to thoroughly review each practice and develop new ones as needed to increase the adaptive capacity of wildlife and natural resources to climate change.
5. Under Section 2207 (1) the Conservation Innovation Grants program is defined to address two new goals of (E) facilitating on-farm conservation research and demonstration activities; and (F) facilitating pilot testing of new technologies or innovative conservation practices. These program areas represent opportunities for research and testing of sustainable adaptation strategies. Projects that address climate change adaptation should be specifically solicited as part of requests for proposals.

### Conservation Stewardship Program (CSP)

Authorized in the 2002 Farm Bill (P.L. 107-171, the Conservation Stewardship Program) pays producers based on the environmental performance of farm-wide stewardship, and requires that producers address identified resources of concern over some portion of their operation. CSP was authorized at an enrollment of 10 million acres per year in the 2014 Farm Bill (P.L. 113-179). Changes to the program specify that all states must identify at least five priority resource concerns for landowners to address, while higher eligibility criteria require that producers address at least two resource concerns during application. Those wishing to renew contracts must address at least two additional priority resource concerns.

Because of its focus on whole-farm resource stewardship, the CSP provides an excellent opportunity to holistically increase the resilience of agricultural production, natural resources, and wildlife as the climate changes. With its goal of

improving overall farm sustainability, this program has the potential to help develop adaptive agro-ecosystems with robust crop production, functioning ecosystem services, and healthy wildlife populations. Like EQIP, CSP should deliver comprehensive conservation actions that rely on natural resource management, rather than human infrastructure, to promote ecosystem service delivery throughout the farm and surrounding natural landscape. The program can also test innovative and sustainable management practices that may have applications for climate change adaptation. We offer the following recommendations to help CSP better address climate change adaptation:

1. We applaud the inclusion in Section 1238D of the 2014 Farm Bill defining conservation activities eligible for CSP payments to include conservation planning; planning is fundamental to successful conservation efforts and requires often significant expenditures from the producer. Conservation planning should be completed with the help of skilled planners, and plans should provide comprehensive management guidance. Plans should include information about climate change vulnerabilities and strategies to increase resilience and adaptive capacity.
2. The 2014 Farm Bill eliminates all references to the Conservation Measurement Tool (CMT), the ranking tool used in the past to enroll land in the CSP. In revising or re-developing a ranking tool for the program, NRCS should award points for practices designed to build resilient natural resources, promote ecosystem services, and increase the adaptive capacity of the entire agro-ecosystem to climate change.
3. Expiring CRP contracts are now eligible for enrollment in CSP, and CSP ranking criteria (Sec. 1238F) gives priority to expiring CRP contracts to protect tax payer investment, as explained by the 2014 Farm Bill Conference Committee Report (U.S. House 2014). It is important to re-enroll land coming out of CRP in other conservation programs to preserve past conservation investments, but enrollment priority should be based on continued stewardship rather than just on prior status. Expiring CRP acreages that will be transitioned to grass-based livestock production will have more conservation value for wildlife habitat than CRP lands returning to crop production. Priority should be given to those expiring CRP applicants that plan to implement grass-based production and that

have completed grazing plans to protect wildlife habitat values on their rangeland.

4. Section 1238F authorizes the Secretary to include other ranking factors to ensure that local, state, and regional resource priorities are addressed. The Secretary should invite comment from State Technical Committees, conservation experts, and the public on including additional ranking factors that will help to address climate change impacts.
5. The Secretary is tasked with identifying no less than 5 priority resource concerns per year – (Sec. 1238G). A priority resource concern is defined as a natural resource concern or problem identified at the national, state, or local level as a priority for a particular area, and that represents a significant concern in a state or region likely to be addressed successfully through implementing conservation activities. Identifying priority resources concerns should involve consultation with State Technical Committees and local workgroups, producers, conservation experts, and the public. Resources impacted by climate change should be included as priority resources.
6. The new law specifies that the Secretary identify “priority resource concerns,” rather than “resource concerns,” as in the 2008 Farm Bill. This has been interpreted to mean NRCS can identify priority resource concerns from a more micro-scale array of natural resource concerns (NSAC personal communication 2014). NRCS’s list of these resources<sup>1</sup> shows that picking 5 resources would allow 5 resources within the same general category to be considered at the expense of protecting a more varied portfolio of resources. Guidance should be provided to ensure that the selection of priority conservation resources includes a balanced sampling of these resources from at least several broad resource categories to achieve the fullest conservation benefits. This list should be reviewed to address potential climate change impacts and resource vulnerabilities.

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1. See [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs143\\_006957.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_006957.pdf)



7. Section 1238G authorizes the secretary to make funding allocations to states based on several factors including, “the extent and magnitude of the conservation needs associated with agricultural production in each State.” This factor should include information about climate change impacts and natural resource vulnerabilities within the state from a state or regional climate change adaptation plan.
8. CSP pilot practices provide an opportunity for farmers to receive payments to test new and innovative practices not widely implemented in the agricultural community. In the future, practices tested under this program should include climate change adaptation actions for agriculture, natural resources and wildlife. Test practices should

include those proposed by partners in the conservation community and should be geared towards increasing overall resiliency of the entire agro-ecosystem.

9. We applaud the managers’ recommendation (U.S. House 2014) that the secretary “ensure producers have the opportunity to adjust their operations while maintaining comparable or enhanced conservation performance of the enrolled acreage and still continuing their contracts,” due to the changes in technology, weather conditions, markets, etc. We suggest this recommendation is important in a climate change future and encourage CSP and all conservation programs to be implemented as part of an adaptive management cycle that provides the flexibility to make changes as needed.

A Yellow-headed blackbird rests on marsh grass in the Prairie Pothole region of South Dakota. Photo by Tim McCabe, courtesy NRCS.



# CONCLUSION

Agriculture has been able to adapt to recent changes in climate; however, increased innovation will be needed to ensure the rate of adaptation of agriculture and the associated socioeconomic system can keep pace with climate change over the next 25 years.

— *U.S. National Climate Assessment, Chapter 6, Agriculture (Hatfield et al. 2014).*

The impacts from climate change will challenge the adaptive capacity of agricultural producers, natural ecosystems, and fish and wildlife species. Variability in temperature and precipitation, increases in extreme climatic events, climate-induced expansions in pests and disease and the loss of ecosystem services will challenge producer's livelihoods and threaten the nation's food security (Hatfield et al. 2014, Walthall et al. 2012). Climate change will also dramatically increase the extinction risk for sensitive wildlife species (Pearson et al. 2014) and degrade ecosystem services (Groffman et al. 2014). In response to these threats we need to develop more sustainable and resilient working lands while protecting our nation's wealth of wildlife and natural resources by increasing conservation efforts and changing

management and policy (NFWPCAP 2012, Walthall et al. 2012). Through strategic implementation that considers the impacts of climate change, the Farm Bill conservation programs can enhance on-farm adaptive capacity by implementing sustainable agricultural practices that bolster ecosystem services and conserve critical natural resources like water and soil. At the same time, these programs can protect fish and wildlife species and the critical habitat they depend on as the climate changes. The recommendations outlined above offer suggestions for using the Farm Bill conservation programs to build resilient agricultural and natural landscapes and to safeguard fish and wildlife species in an uncertain future.

Healthy sage matrix habitat in Harney County, Oregon. Photo by Berta Youtie, courtesy Eastern Oregon Stewardship Services.



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