

U.S. FISH AND WILDLIFE SERVICE
CLIMATE CHANGE ACTION PROGRAM
&
NATURE-BASED SOLUTIONS FOR FOREST ADAPTATION



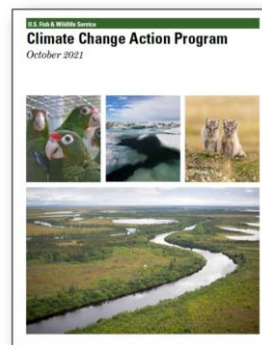
Kurt A Johnson, USFWS - Science Applications
Sara Ward, USFWS - Ecological Services

March 15, 2022



GOALS

- Provide an overview of the US Fish and Wildlife Service's Climate Change Action Program
- Discuss the Service's approach to forest adaptation utilizing nature-based solutions, specifically natural Infrastructure and natural climate solutions
- Introduce the "Climate Adaptation for Forest-Dependent Wildlife" Webinar Series



CLIMATE CHANGE ACTION PROGRAM

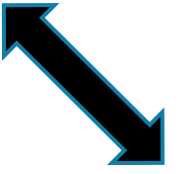
EO 14008
Tackling the Climate Crisis at Home and Abroad

EO 13990
Protecting Public Health and the Environment and
Restoring Science to Tackle the Climate Crisis

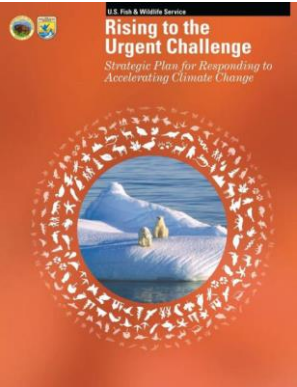


DOI
Climate Action Plan

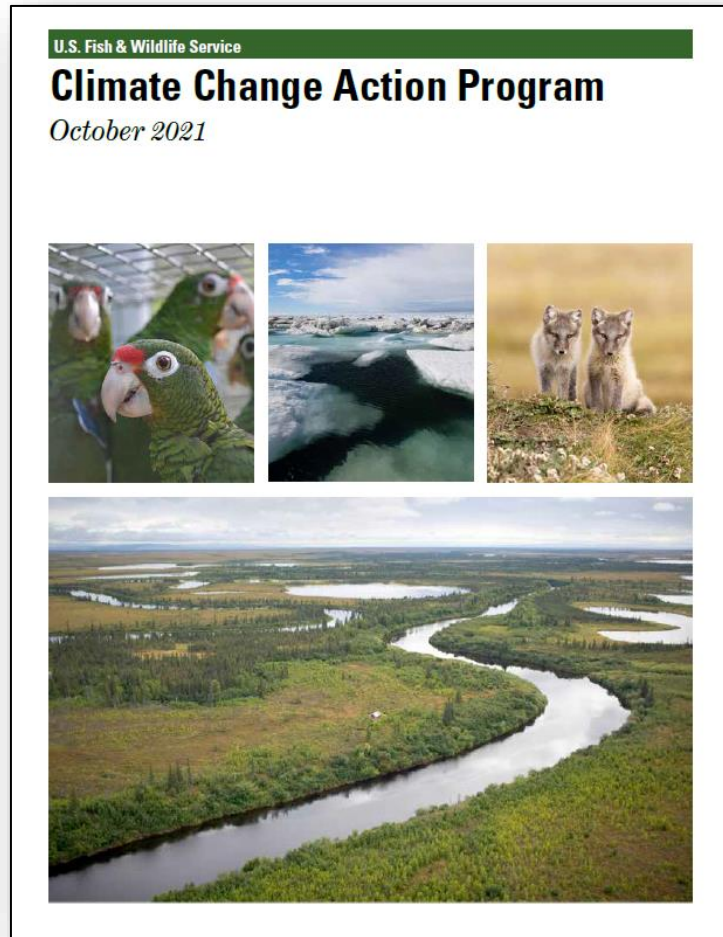
DOI
Sustainability Plan



USFWS
Climate Change Action Program



CCAP Vision



The U.S. Fish and Wildlife Service (Service) will rise to the challenge of transforming landscapes and waters with focused skill, creativity, and innovation, guided by sound science and conservation practice in the fulfillment of our Mission. We will question assumptions based on past conditions, develop and use new tools to guide decisions, support our employees, and integrate climate adaptation as a guiding principle throughout the agency as we confront a new and uncertain future. The Service will be a leader for effective, collaborative conservation in a rapidly changing world.

7 ELEMENTS OF THE CCAP "LIVING FRAMEWORK"

1. Adaptation and Resilience

- Expand implementation strategies on- and off-Service Lands (Nature-based Solutions, Natural Infrastructure, Resist-Accept-Direct Framework)
- Tools for Landscape Conservation design, planning, and delivery

2. Climate Science

- Identify and address climate science and spatial planning needs
- Develop climate metrics & tools to guide priorities
- Guidance and training development on CC Science; development performance metrics

3. Adaptation Strategy

- Build on collaborative LCD and adaptation planning for national strategy
- Incorporate watershed and regional partnership priorities

4. Partnerships

- Work with national and regional Tribal/First Nation/Indigenous groups on shared priorities
- Cultivate expanded partnerships / leverage delivery – natural and working lands
- Communication inreach/outreach

5. Climate Mitigation

- Renewable energy
- **Natural Climate Solutions (habitats/strategies) that leverage co-benefits**
- Track and reduce Service's carbon footprint

6. Policy

- Evaluate and update existing policy to promote whole Service approach to coordinated CC response
- Develop new policy as needed

7. Capacity

- Expand capacity to implement on the ground adaptation/resiliency/mitigation projects

CCAP is a Living, Whole-Service Framework

- Prioritizes strategies to maximize adaptation, resilience, and mitigation potential
 - High return investments in right places
 - Optimize and eliminate barriers for delivery of climate priorities
- Builds on FWS strong climate science foundation and demonstrated delivery of resiliency (Hurricane Sandy) and mitigation (biological carbon sequestration)
- Accelerates and scales up on-the-ground implementation of interventions (manage, restore, identify and conserve) to “move the needle” on climate adaptation, resiliency, and mitigation
- Facilitates cross-programmatic assessment of climate risks and opportunities
- Amplifies “co-benefits” of climate actions for trust resources

NATURE-BASED SOLUTIONS

WHAT ARE NATURE-BASED SOLUTIONS (NbS)?



Nature-based solutions (NbS) are actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges, such as climate mitigation and adaptation, while simultaneously providing human well-being and biodiversity benefits.

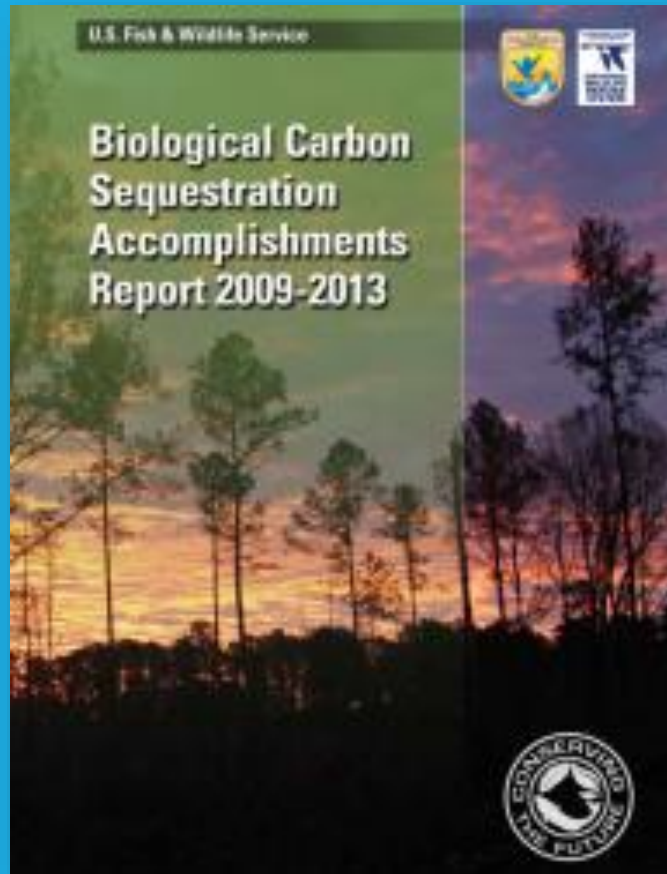
HOW DO NATURE-BASED SOLUTIONS WORK?



EPA Administrator Regan discusses nature based climate solutions at Pocosin Lakes NWR

1. Improve ecosystem resilience (and help wildlife and human communities adapt to climate change) and protect ecosystem services via natural infrastructure
2. Reduce greenhouse gas (GHG) emissions from land use and land use change (avoided loss)
3. Remove CO₂ from the atmosphere and store it in natural systems (carbon storage)

FWS IS A LEADER IN NATURE-BASED SOLUTIONS (NbS)

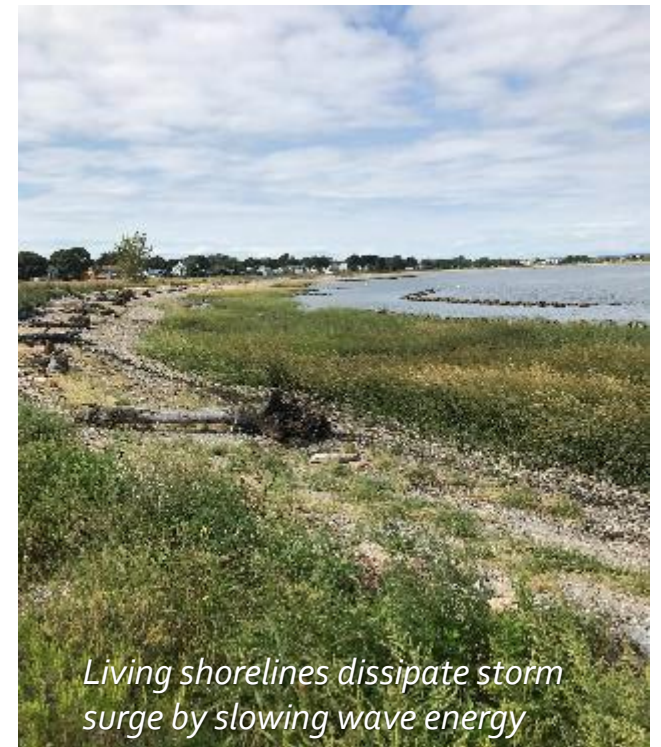


- FWS is focused on NbS delivery via:
 - Natural infrastructure (NI)
 - Natural climate solutions (NCS)
- Terminology may be new to some, but NI and NCS strategies are tried and true
- Legacy of successful projects with climate “co-benefits” (simultaneous added societal gains) that conserve, restore, and enhance habitat
- Goal is to *accelerate* and *expand* delivery of NbS on- and off-Service lands (e.g., working & private lands)
- Critical importance of PARTNERSHIPS!!

What is natural infrastructure (NI)?

Any type of living feature that mimics natural ecological processes and provides additional human benefits.

NI is less costly than hardened (grey) infrastructure and builds resilience through time as it grows (and may sequester carbon in the vegetation and root stocks underground).



FWS PFW; Riparian Restoration in Vermont (VT Agency of Ag)

Natural Infrastructure: Forested Landscapes & Water

Forests and wetlands provide essential services to water utilities, businesses, and communities—from water flow regulation and flood control to water purification and water temperature regulation.

To ensure these ecosystem functions and associated benefits continue, communities can strategically secure networks of natural lands, working landscapes, and other open spaces as “natural infrastructure.” – WRI 2013

Figure 7 | Forest Importance to Surface Drinking Water and Watersheds with High Risk (Top 10 percent)

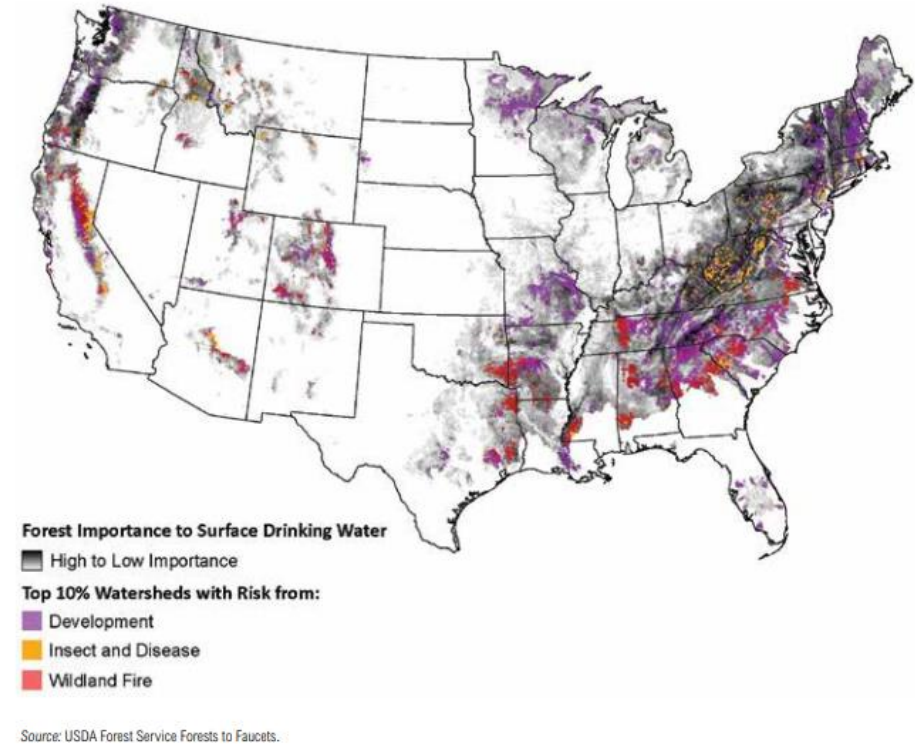
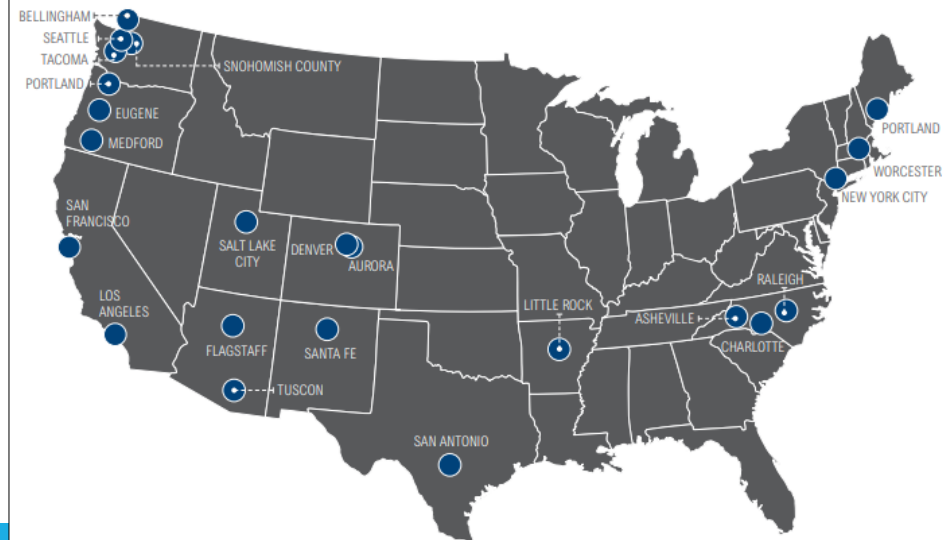


Figure 8 | Sample of Cities that Have Invested in Forest-Based Natural Infrastructure



What are natural climate solutions (NCS)?

Actions to:

1. Protect, sustainably manage, and restore habitats while at the same time storing carbon or avoiding greenhouse gas emissions
2. Provide additional “co-benefits” (such as flood storage and human community resiliency)

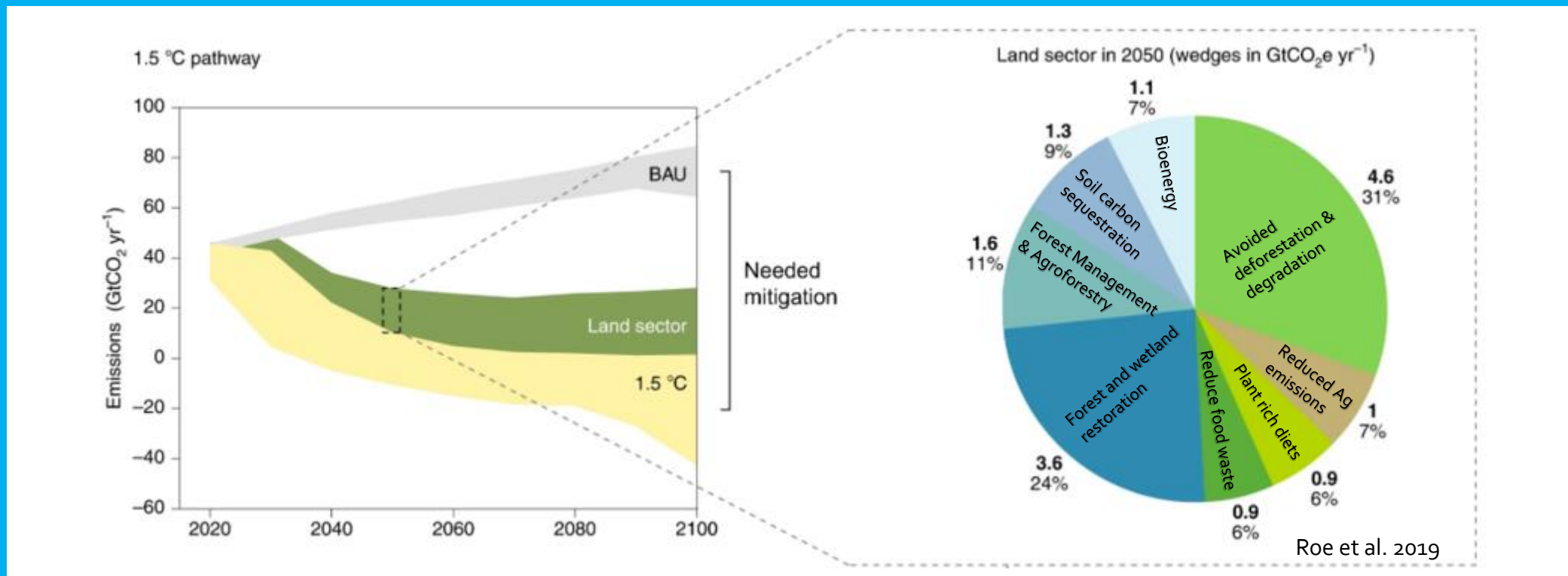
Natural and working lands (NWL) and wetlands play key role in the global carbon cycle. NCS maximize nature’s full climate mitigation potential



Area being hand-planted to bottomland hardwood tree species on Tensas River National Wildlife. Credit: USFWS

HOW DO NCS PROMOTE NET ZERO BY 2050?

- Deliver up to 30% of carbon reduction needed to limit warming 1.5°C
- NCS among best options when coupled with clean energy innovation and decarbonization



What are “co-benefits” of climate mitigation?

Co-benefits of climate change mitigation are the positive benefits related to the reduction or avoided loss of greenhouse gases

(IPCC AR4)



The Service's "Menu" of Natural Climate Solutions

- Build on our successes (over five dozen NCS projects on refuges)
- We're making a NCS user toolkit
 - Menu / roadmap / spatially explicit maps to prioritize NCS implementation
 - Accounting (inventory, benefits estimator)
 - Policy (carbon reporting and crediting)
- Impact partnerships
 - Federal, State, local & tribal (pre-mitigation, GAOA, incentives stacking)
 - Innovative (working lands, tree equity, carbon partners)

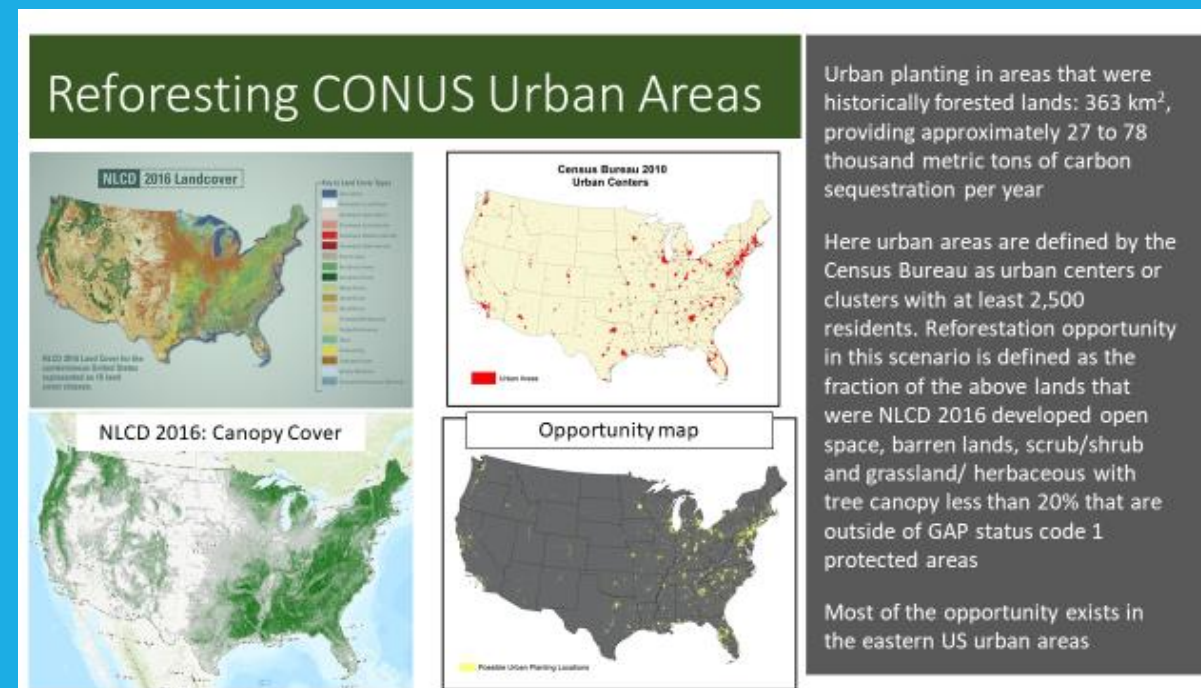
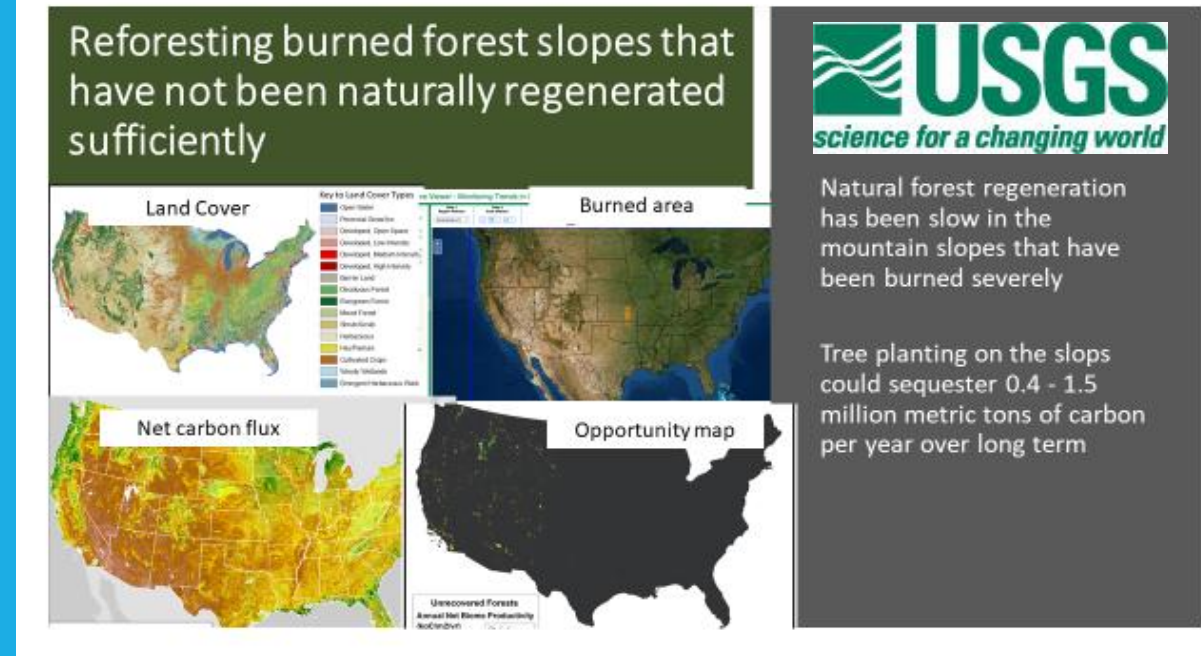
FWS "Menu" of NCS Strategies	
Land Type / Habitat	Natural Climate Solution
Forests	Reforestation
	Avoided forest conversion
	Forest management / enhancement (incl. Rx fire)
Grassland	Avoided grassland conversion
	Grassland restoration
	Grassland management / enhancement (incl. Rx fire)
Agriculture	Soil health/retention practices
	Nutrient management practices
	Pest management practices
Urban Lands and Green Space	Urban Reforestation
	Grassland / pollinator restoration
Sagebrush Biome	Rangeland management (incl. Rx fire)
	Sagebrush avoided conversion
	Sagebrush restoration
Peatlands	Peatland avoided loss
	Peatland rewetting
	Peatland enhancement
Non-Tidal Wetlands	Riparian floodplain/buffer revegetation
	Non-tidal wetland avoided loss
	Non-tidal wetland restoration
	Non-tidal wetland enhancement
Tidal Wetlands	Tidal marsh restoration
	Tidal marsh avoided loss
	Tidal marsh enhancement
Intertidal Zone	Seagrass and mangrove restoration/avoided loss
	Oyster reef installation?
	Avoided seagrass loss

USGS REFORESTATION OPPORTUNITY MAPS

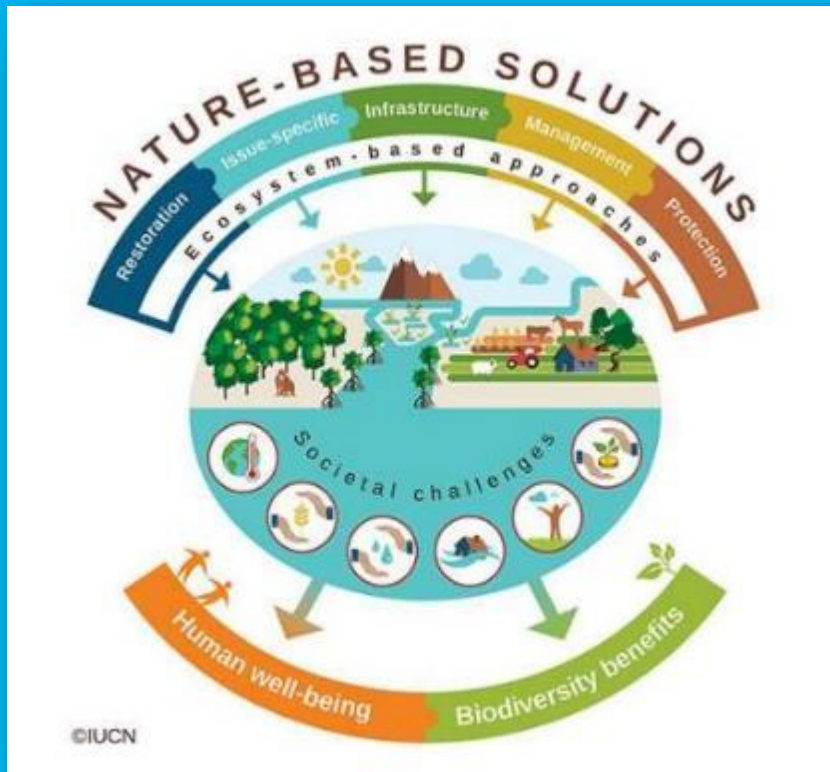
- USGS has been investigating forest restoration opportunities in CONUS
- Nine restoration opportunities have been investigated; two examples provided here
- The slides are proof of concept, more targeted analysis would be required to achieve acceptable confidence and uncertainty level

The slides are produced by USGS scientists on an interim basis for internal use by FWS, the work has not been reviewed and approved

Credit: Victoria Woltz, Kevin Kroeger, Sydney Nick, Lisamarie Windham-Myers, Eric Ward, Camille Stagg, and Zhiliang Zhu



THE CASE FOR NbS



Supports our mission; addresses local / watershed needs and site-specific conditions

Cost-effective NbS; efficacy improves over time; high cost of inaction (wildfire, structural damage)

Strategic NBS implementation can maximize measurable ecosystem service co-benefits

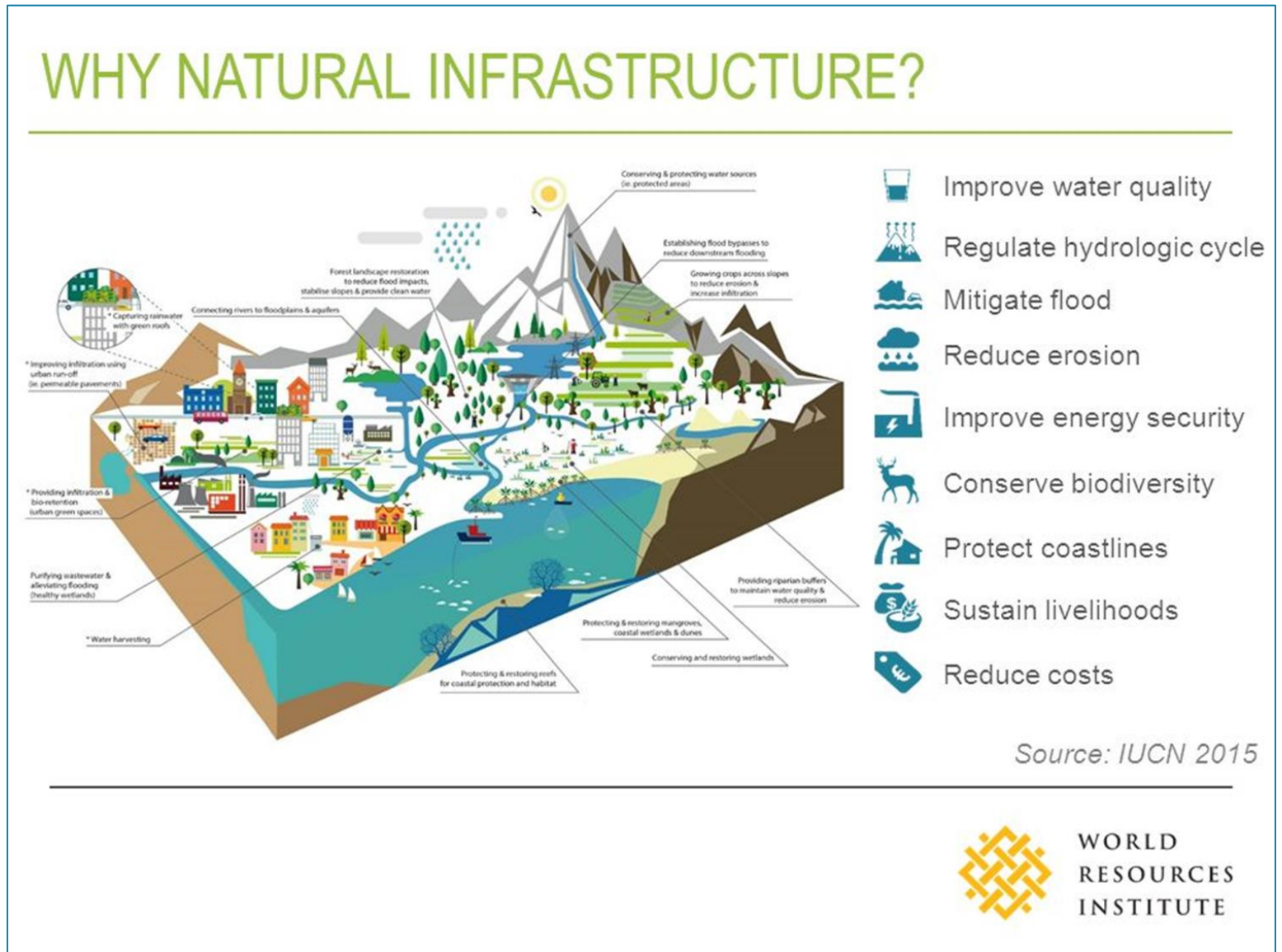
Key to innovative partnerships to restore and connect the Nation's lands and waters

Break for Questions

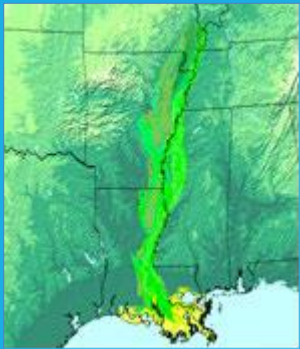
How NI and NCS promote forest adaptation.

NI & NCS are often inextricably linked.

- Reconnecting Forests
- Adaptive Forestry
- Floodplain Protection
- Urban Forestry/Tree Equity
- Facilitate Ecological Transformation
- Restoring Forest Habitat – NCS
- Restoring Thornscrub Habitat -- NCS
- Avoided Carbon Loss (Peatlands) -- NCS

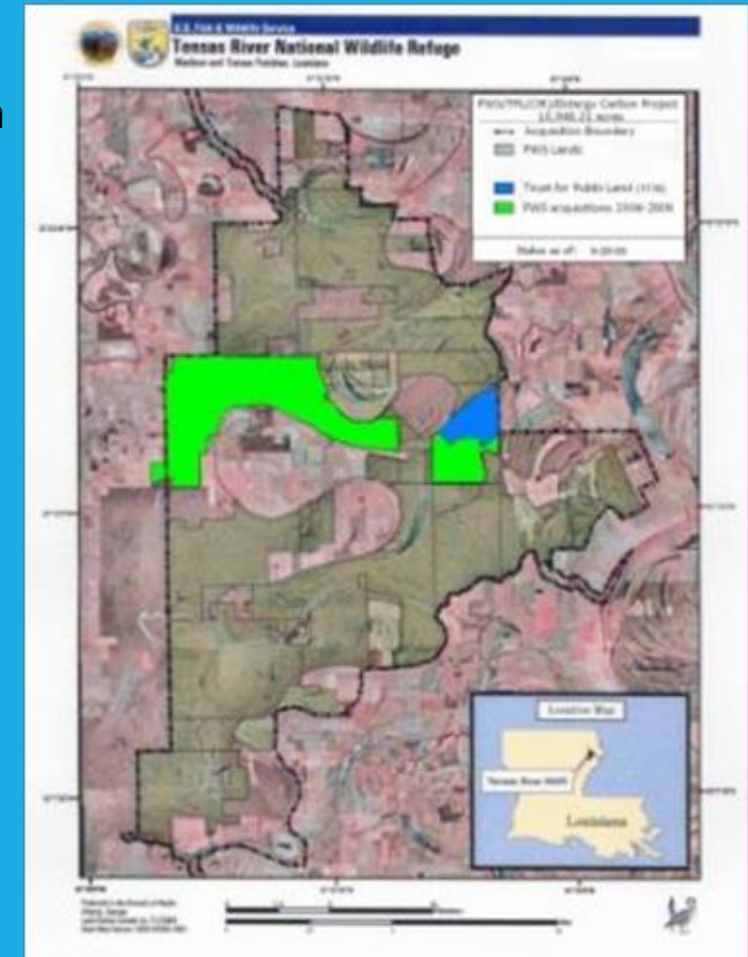


RECONNECTING FORESTS: TENSAS RIVER NWR



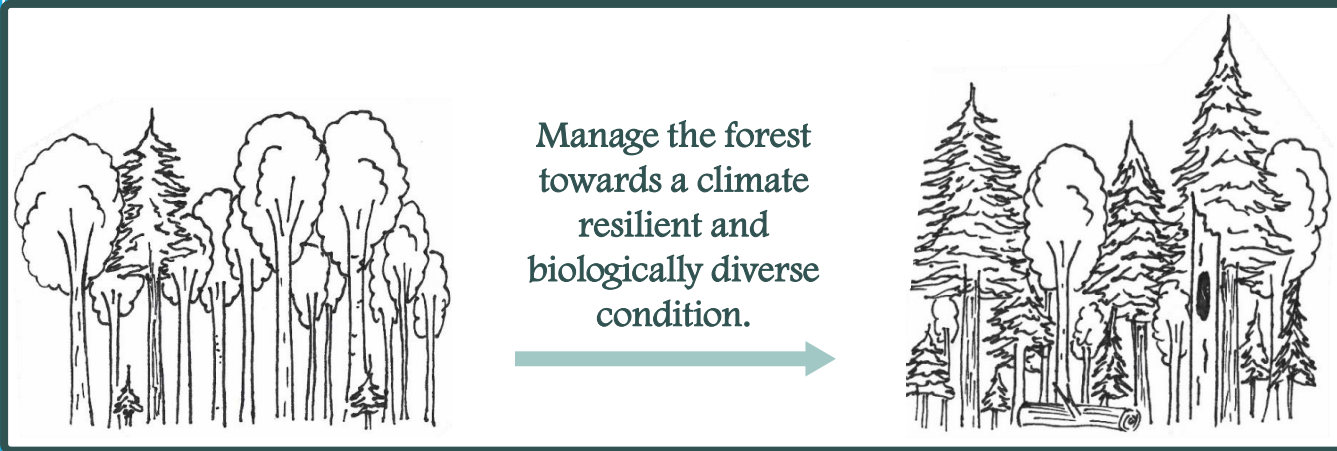
Forest cover in the Lower Mississippi Alluvial Valley (light green) Pre-settlement (left) and in 1992 (right).

- **Goal:** Reconnect blocks of bottomland hardwood forest in Tensas River NWR (LA). Area was cleared for farming and lies between two separate refuge units.
- **Action:** From 2003-20029, partners planned, acquired and reforested ~ 11,000 ac of Bottomland Hardwoods and transferred to Refuge. Portions of restoration were formally validated for carbon lift.
- **Partners:** Trust for Public Land, Carbonfund, Entergy and others.
- **Adaptation:** As the forest matures, a forested block of more than 75,000 ac will be created.
- **Co-Benefits:** Improved water quality by protection of frontage on Tensas River; increased recreation opportunities.





ADAPTIVE FORESTRY: UMBAGOG NWR



- **Goal:** Manage forest habitat for migratory birds in consideration of climate change
- **Action:** Since 2012, over 3,500 ac managed to promote warm climate tree species.
- **Adaptation:** This reduces risk of wildfire, habitat collapse, invasive species.
- **Co-Benefits:** Sustainable forestry ensures continued carbon sequestration and storage.
- **Partner:** Work with private forestry sector (SAPPI).



Identify areas needing forest management.



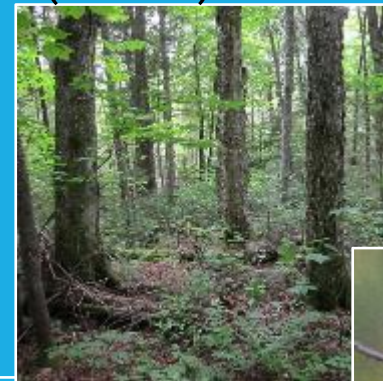
Select trees for removal to promote regeneration and growth.



Loggers carefully remove selected trees with specialized equipment.

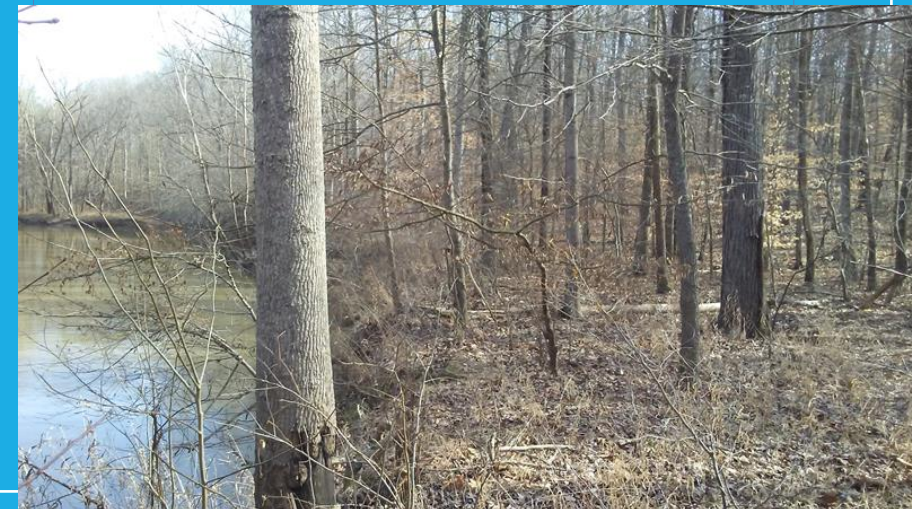
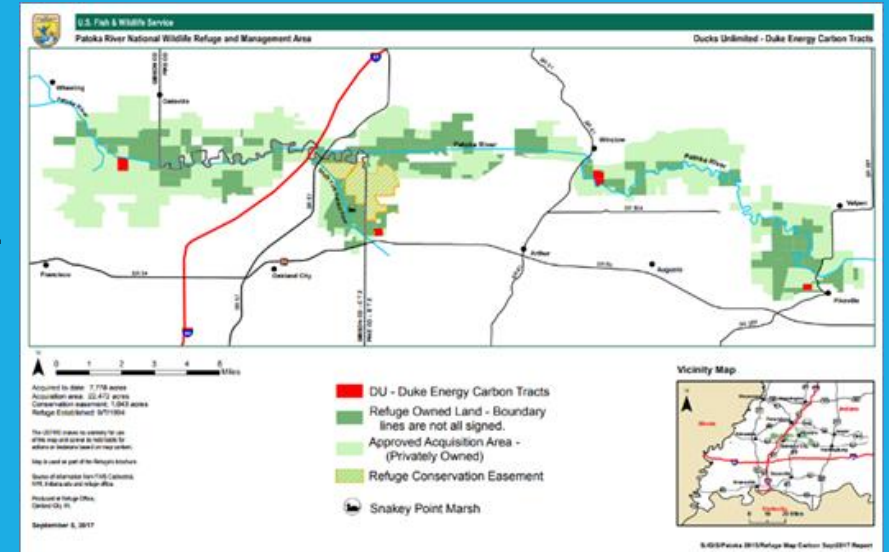


Habitat quality increases, healthy forests thrive, harvested trees generate income.



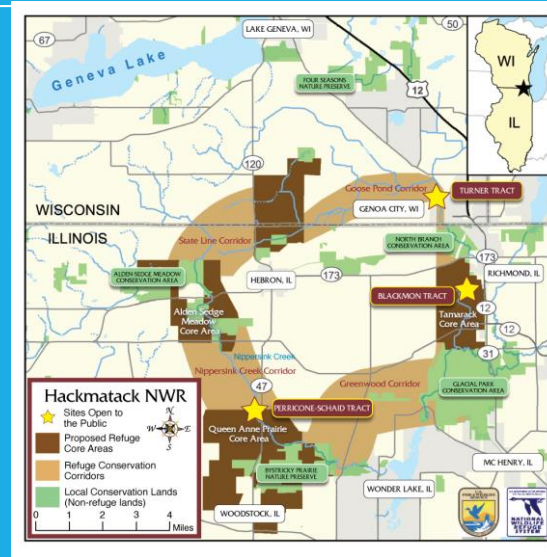
FLOODPLAIN PROTECTION: PATOKA RIVER NWR

- **Place:** Patoka River NWR in SW Indiana. USFWS owns ~ 9,000 ac in non-contiguous parcels within 22,472 ac boundary. Principal habitat is Bottomland Forested Wetland.
- **Goal:** Grow Refuge by connecting blacks in consideration of climate change.
- **Partners:** Principally Ducks Unlimited (DU) and Duke Energy (DE).
- **Action:** (1) DU partnered with DE to purchase 187 ac in 4 tracts. (2) Tracts were reforested with bottomland hardwoods; (3) DU gave DE a carbon sequestration easement; (4) DU sold tracts to USFWS for Refuge.
- **Adaptation:** Refuge worked w/ partners (DU, IL DNR) and NIACS to develop reforestation plan for tracts that identified flood-adapted species that might gain habitat in the area due to climate change.
 - Managers included new potential migrants in approximately 10% of their planting Climatic Change mix. Planting took place in summer 2017.
- **Co-Benefits:** Reforestation will create new bottomland forest habitat, connect habitat blocks, and help make system more resilient to flooding.



URBAN FORESTRY: HACKMATAACK NWR

- **Place:** Hackmataack NWR in NE Illinois and SE Wisconsin. 1-hour drive from major metro areas of Chicago, Madison, Milwaukee, and Rockford.
- **Goal:** Hackmataack will become a mosaic of ~ 10,000 ac of grasslands, wetlands, and forested stream corridors; resilient to climate change.
- **Partner:** OPENLANDS



- **Action:** USFWS partnered with OPENLANDS and its Urban Forestry program to plan and implement reforestation activities that consider climate change in the Nippersink Watershed.
- **Adaptation:** Used the NIACS Adaptation Workbook to assess priorities:
 - Remove invasive species and replace with recommended low-vulnerability, shade-tolerant species to protect waterways.
 - Protect waterways by maintaining or increasing tree canopy.
- **Co-Benefits:** Increased flood protection, drought resistance, and connectivity of stream corridors.

Volunteers are implementing many of these activities.



GHOST FORESTS: BLACKWATER NWR

Goal: Blackwater NWR on MD's eastern shore has been losing ground to SLR and other factors, which is drowning marshes and creating ghost forests. Goal is to preserve marsh habitat of value to wildlife.

Planning: Refuge staff planned for the future following the Resist-Accept-Direct Framework and "Blackwater 2100" report produced by partners.

Action: At one upland site, Refuge has removed trees in area likely to succumb to SLR rise in near future.

Adaptation Significance: This may help promote formation of marsh vegetation & reduce phragmites encroachment. Staff hope this may help guide upslope migration of marshes in response to SLR.

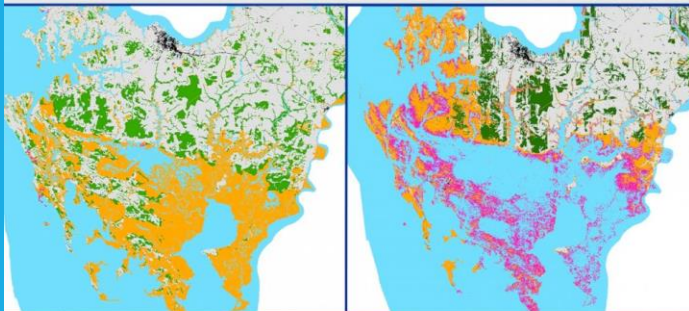
Co-Benefits: Continued marsh habitats for wildlife at Blackwater NWR. Reduced ghost forest extent.



PROJECTED CHANGES IN BLACKWATER NATIONAL WILDLIFE REFUGE

2021
CURRENT CONDITION

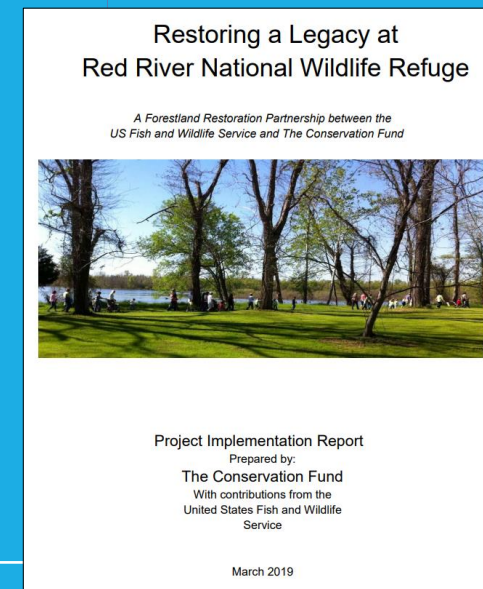
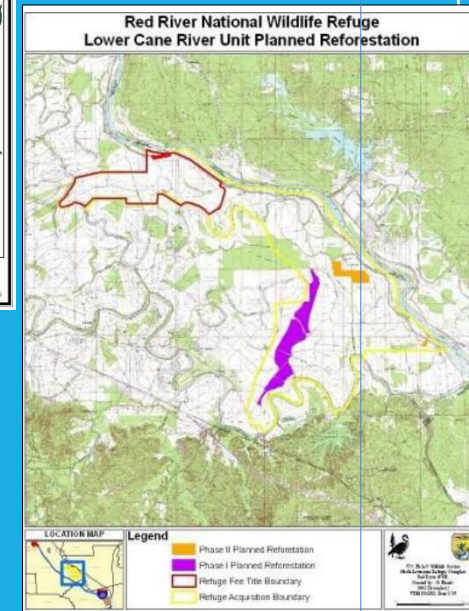
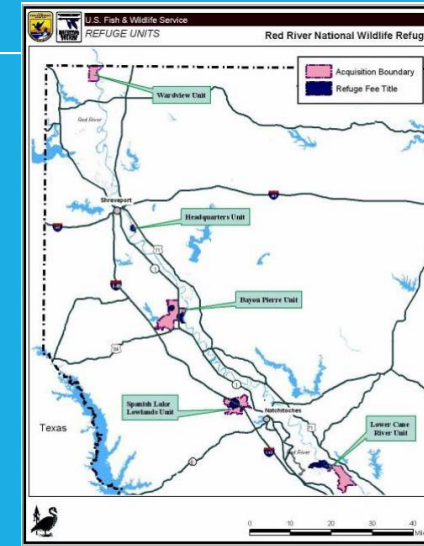
2100
PROJECTED CONDITIONS
3.4 foot sea level rise



Legend:
■ Developed Land ■ Undeveloped Dry Land ■ Forested ■ Emergent Marsh
■ Tidal Flat ■ Open Water

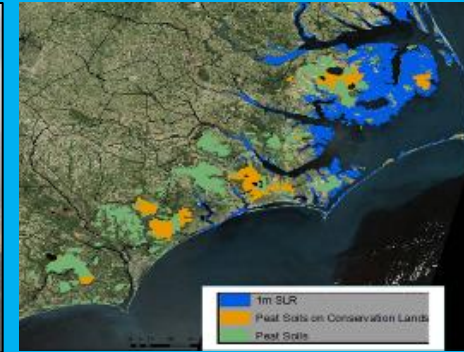
RESTORING HABITAT: RED RIVER NWR

- **Place:** Red River NWR, LA
- **Goal:** Working with The Conservation Fund (TCF) to restore bottomland hardwood forests in areas that had been converted to ag use.
- **Action:** (1) TCF purchased 1,173 ac of private ag land within Refuge boundary; (2) TCF restored native bottomland hardwood forest by planting native tree species selected specifically for the project. (3) After restoration, land was conveyed to USFWS for Refuge.
- **Adaptation:** Project primarily designed to create bottomland hardwood habitat while sequestering carbon.
- **Co-Benefits:** Carbon benefits from Project withheld from regulated GHG markets and essentially retired upon their sale. Enhancement of water quality of Red River. Community benefits, e.g., hunting, fishing, wildlife photography, wildlife observation, environmental education.
- **Validation & Monitoring:** Project validated in May 2009 at the Gold Level using standards of the Climate, Community & Biodiversity Alliance. Monitoring report completed in March 1, 2019.

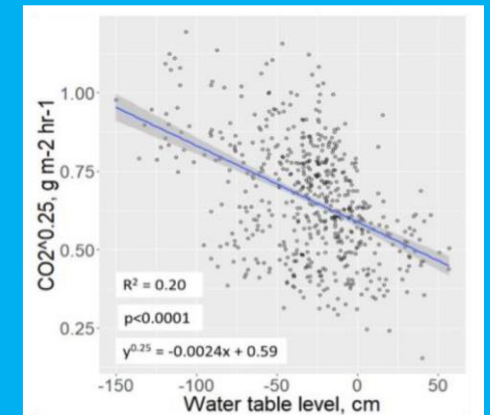


PEATLANDS: POCOSIN LAKES NWR

- **Place:** Pocosin Lakes NWR, NC
- **Goal:** Large-scale re-wetting of highly altered forested peatlands.
- **Action:** ENC peatlands sequester 6.3 MT CO₂e/ac/yr when restored; ~37,000 acres restored at Pocosin Lakes NWR to date. Additional on- and off-refuge restoration opportunities identified
- **Planning:** Demo project resulted in final American Carbon Registry methodology for application throughout southeast and resolution of mechanism for partners to report carbon offsets
- **Co-Benefits:** enhanced habitat, water and air quality protection, protect peat soil (and elevation), reduced frequency / intensity of wildfire, lessened storm flooding and saltwater intrusion, minimize human community impacts, climate adaptation.



Peatlands comprise 3% of world land area but contain 2X the global forest biomass carbon stock. The cost of inaction is great: globally important wetlands, wildfire losses irretrievable, valuable ecosystem co-benefits)



Emissions reductions are related to increasing water table during restoration

Climate Adaptation for Forest-Dependent Wildlife Webinar Series

The U.S. Fish and Wildlife Service (FWS) - Forest Ecology Working Group (FEWG), Science Applications and Migratory Birds Programs, and the National Conservation Training Center (NCTC) are joining the USDA Forest Service and Northern Institute of Applied Climate Science (NIACS) in sponsoring this 12-month webinar series.

Part 1: Setting the Stage – Climate Impacts

Part 2: Disturbance Ecology and Disturbance Regimes

Part 3: Forest Adaptation Examples for Wildlife



U.S. Fish & Wildlife Service
National Conservation Training Center
Training Announcement

**Climate Adaptation
for Forest-Dependent
Wildlife**
Webinar Series

This 12-part monthly webinar series tells a story about climate change and its impacts on forest ecosystems and forest-dependent wildlife species, sharing tools and management approaches to help facilitate forest and wildlife climate adaptation at both landscape and stand scales.

THANK YOU VERY MUCH!

