



MISSOURI DEPARTMENT OF CONSERVATION

WETLAND PLANNING INITIATIVE Strategic Guidance Document



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February 1, 2015

My fellow Missourians,

I write this letter on behalf of the Missouri Department of Conservation as both a thank you and a challenge.

First, I offer my thanks. I am grateful for our citizen's support of Missouri's rich natural resource heritage. It is because of this support that Missouri has enjoyed many conservation successes.

Wetland conservation represents one of Missouri's most significant success stories. Through the tireless work of Missouri's individuals, conservation organizations, and government agencies, our state has restored many new wetlands that now support an abundance of fish and wildlife and afford outstanding recreational opportunities. A few examples of our wetland conservation successes are:

- Conservation sales tax contributed to the development and ongoing management of eight new Managed Wetland Areas that are now recognized nationally for supporting waterfowl and other migratory birds.
- Landowners have protected and restored over 150,000 acres of wetlands on private lands.
- Conservation partners leveraged \$117 million to secure over 97,000 acres of wetlands through the North American Wetlands Conservation Act.

Now I offer a challenge. Let's work together to provide our children and grandchildren the chance to be inspired by wetlands. As an introduction to this challenge, I offer the Department's Wetland Planning Initiative. This Initiative is described in two documents. The first, a Strategic Guidance Document, highlights the Department's approach to wetland conservation. The second, an Implementation Plan, represents a spring board for us to work together to find new and innovative ways to protect, manage, and conserve Missouri's wetlands.

I thank you, and I look forward to your continued partnership as we move forward to Missouri's next era in wetland conservation.

Sincerely,

Bob Ziehmer, Director

Acknowledgements

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MISSOURI DEPARTMENT OF CONSERVATION WETLAND STRATEGIC GUIDANCE DOCUMENT

Preface

The Missouri Department of Conservation (Department) recognizes the importance of wetland conservation as part of its overall mission to protect and manage the forest, fish, and wildlife resources of the state and to facilitate and provide opportunities for all citizens to use, enjoy, and learn about these resources. The Department also recognizes that wetland conservation is sustained by Missourians' support of the Department's overall mission. Foremost of this support is the dedicated 1/8 of 1% sales tax that funds long-term conservation of forests, fish, and wildlife. The Department aspires to match this remarkable support by working to ensure the highest levels of accountability and efficiency as it pursues its mission.

The Department looks forward to the next era in wetland conservation in Missouri through the implementation of a Wetland Planning Initiative (Initiative). This Initiative builds on the successes of the Department's 1989 Wetland Management Plan and charts a course that ensures current and future generations will have opportunities to appreciate, value, and enjoy the many benefits of wetlands. This charted course includes promoting and building upon the partnerships that have served as the foundation of wetland management and conservation in Missouri. It is a course through which the Department embraces public engagement and recognizes that working with partners and citizens will be necessary to achieve shared wetland management and conservation goals.

The Initiative includes the Wetland Strategic Guidance Document and the Wetland Implementation Plan. These documents are not a State of Missouri plan. They provide direction for the Department, which has no regulatory authority over wetlands, water quality, or water use.

The **Wetland Strategic Guidance Document** herein describes the Department's overall approach to wetland management and conservation in Missouri. It includes the Initiative's wetland conservation mission, vision, goals, and guiding principles. It also sets forth guidelines for implementation and decision-making.

The **Wetland Implementation Plan** serves two purposes. First, it provides guidance and details the tools and information needed for Department wetland management and conservation actions. Second, it is an invitation for partners to work with the Department on wetland conservation issues of mutual interest. It will be a "living" document that is periodically updated to reflect stakeholder and partner input and adaptive improvements in short- and long-term strategies.

Together, the Wetland Strategic Guidance Document and the Wetland Implementation Plan will direct the Department's wetland management and conservation actions. They also will guide efforts to move forward with conservation partners, communities, and interested private landowners, on a voluntary basis, to conserve wetlands.

MISSOURI DEPARTMENT OF CONSERVATION WETLAND STRATEGIC GUIDANCE DOCUMENT

Executive Summary

The Wetland Strategic Guidance Document describes the Missouri Department of Conservation's approach to wetland management and conservation in Missouri. It includes the Department's Wetland Planning Initiative mission, vision, goals, and guiding principles. It also sets forth guidelines for implementation and decision-making.

A companion document, the Wetland Implementation Plan, provides additional, more detailed guidance to Department staff involved in wetland management and conservation activities. It also is an invitation for partners to work with the Department on wetland conservation issues of mutual interest.

The Department's commitment to wetland conservation is embodied in the Initiative's mission and vision statements and is expressed as six goals that focus on the diverse roles that wetlands play in stream-floodplain-watershed systems and in society.

Mission: To protect, restore, and enhance wetland ecological functions and values for multiple social and natural resource benefits based on sound scientific principles, effective management, and public engagement practices.

Vision: To be a national leader in wetland conservation by using an adaptive framework and strong partnerships to meet the needs of wetland plants and animals, to garner public awareness and support for wetlands, and to promote recreational uses of these valued habitats.

Goals: The mission and vision will be achieved by taking a holistic approach to wetland conservation through the integration of six interdependent goals. Three of the six goals explicitly acknowledge the ecological ties between the surrounding lands, health of wetland habitats, and plants and animals that depend on those habitats. The remaining three goals focus on social interactions and how wetland-related partnerships are underpinned by groups sharing a similar conservation ethic and made up of individuals that appreciate the benefits of wetlands.

Wetland Ecological Goals

Goal 1. Functioning Watersheds Maintain and improve ecological functions of Missouri stream-floodplain-watershed systems by integrating wetlands within lands that can include agriculture, businesses, and communities.

Goal 2. Healthy Wetlands A diversity of habitats to meet the life history needs of wetland plants and animals, to support a variety of recreational experiences, and to provide ecological services beneficial to society.

Goal 3. Thriving Plants and Animals Resilient populations of wetland-dependent plants and animals that support high-quality recreational experiences and many ecological and social benefits.

Wetland Social Goals

Goal 4. Strong Partnerships Citizens, landowners, communities, conservation organizations, and government agencies working together to support wetland conservation and the continued use and enjoyment of these diverse habitats.

Goal 5. A Shared Conservation Ethic A conservation ethic that is shared by citizens and reflected in the identities of individuals and communities, and founded on the appreciation of healthy, abundant, and diverse natural resources.

Goal 6. Engaged Citizens Citizens engaged in wetland-related recreation and conservation and a general public that supports the social and ecological benefits provided by wetlands.

Guiding Principles

The Department's wetland conservation efforts will be guided by several principles. The Department recognizes that wetlands are valuable components of Missouri's stream-floodplain-watershed systems and that landscape alterations have led to extensive loss and degradation of Missouri wetlands.

Successful conservation of wetlands will require acquisition, protection, restoration, and management actions. These conservation actions should integrate wetlands into appropriate stream-floodplain-watershed system settings, sustain and restore ecosystem functions, and provide connectivity among adjacent uplands and aquatic habitats. Water stewardship, scientific research and monitoring, advocacy, and information-sharing with professionals and the public

will all be necessary to ensure continued support, understanding, and protection of wetland systems and their values.

Achieving wetland conservation and associated public use opportunities will require long-term integrated planning and coordination that seek multiple benefits, identify tradeoffs, are adaptable to new challenges, and involve many partners. The waterfowl hunting community has a long tradition of being a valued partner and the Missouri heritage of waterfowl hunting will remain an important component of wetland conservation and management.

Guidelines for Implementation

Three primary guidelines for implementation provide the foundation for engagement of a diversity of stakeholders at multiple scales and links the art and science of wetland management. The first guideline stresses a systems perspective, one that places emphasis on working within both ecological and social systems to create desired outcomes. The second guideline requires decision analysis, where time is taken to analyze decisions rigorously to capitalize on opportunities for learning and continuous improvement. The last guideline sets an expectation for enhanced coordination and collaboration among partners at local, regional, flyway, and continental scales.

Decision Categories

The Wetland Implementation Plan provides clearly stated objectives and strategies that will be applied to six broad categories of decisions: water stewardship, wetland infrastructure design and maintenance, habitat management, population management, landscape and watershed planning, and public engagement. The implementation guidelines provide direction and alternatives for decisions in these six categories. The Wetland Implementation Plan is intended to facilitate the improvement of decision outcomes and promote efficient, effective, and transparent management of wetlands for the benefit of plants, animals, and Missouri's citizens.

MISSOURI DEPARTMENT OF CONSERVATION WETLAND STRATEGIC GUIDANCE DOCUMENT

Introduction

The Missouri Department of Conservation (Department) recognizes the importance of wetland conservation as part of its overall mission to protect and manage the forest, fish, and wildlife resources of the state and to facilitate and provide opportunities for all citizens to use, enjoy, and learn about these resources. The Department has created a new Wetland Planning Initiative (Initiative) to maintain and enhance the many ecological and social benefits provided by wetlands and to meet Missourians' expectations for improved conservation of these resources. The Department aims to advance wetland conservation through adaptive learning, creative thinking, embracing technology, and improved understanding of natural resource and social landscapes.

The Department embraces a holistic management philosophy that considers wetlands in the context of ecological and social systems. From an ecological perspective, this philosophy recognizes wetlands as important components within larger stream-floodplain-watershed systems (Figure 1). From a social perspective, it acknowledges the need to strengthen ties between nature and society by providing quality recreational experiences, fostering awareness of the social benefits provided by wetlands, and encouraging citizens and partners to participate in wetland conservation (Figure 2). This holistic philosophy is the foundation for enhanced coordination among partners, improved management of existing wetlands using an adaptive approach, and strategic wetland acquisition and restoration as part of larger Department efforts, such as the Comprehensive Conservation Strategy.

The Department's planning efforts will focus on Department-managed wetlands and on working with partners to integrate wetland conservation into lands that include local agriculture, businesses, and communities. The Department's wetland conservation goals reflect a commitment to manage the wetlands it holds in public trust and to provide opportunities for Missourians to use and enjoy wetlands and understand the ecological and social values of these diverse habitats.

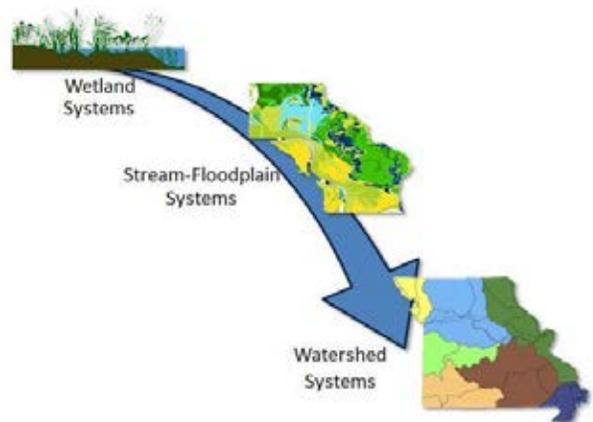


Figure 1. Wetland systems are one component nested within larger stream-floodplain-watershed systems.

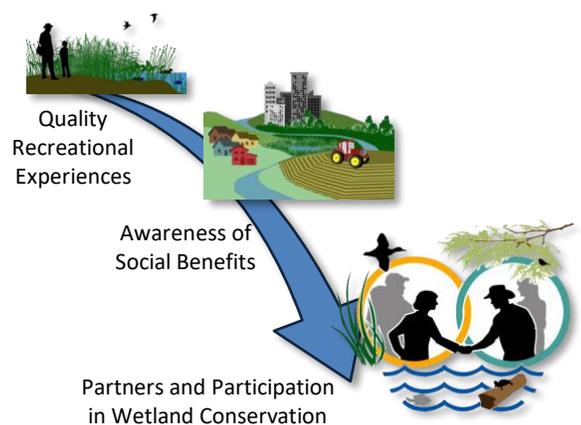


Figure 2. Strengthening ties between nature and society requires targeting social systems at multiple scales.

This **Wetland Strategic Guidance Document** describes the Department’s overall approach to wetland management and conservation in Missouri. It includes the Initiative’s mission, vision, goals, and guiding principles. It also sets forth guidelines the Department will follow when making decisions and implementing actions to achieve Initiative goals.

A companion document, the **Wetland Implementation Plan**, serves two purposes. First, it provides additional guidance to Department staff involved in wetland management, conservation, and public engagement activities. Second, it is an invitation for partners to work with the Department on wetland conservation issues of mutual interest. The Department values the opinions of stakeholders and partners and will seek input frequently to further refine wetland management and conservation efforts. The Wetland Implementation Plan will be a “living” plan that is updated periodically to reflect stakeholder and partner input as well as adaptive improvements to short- and long-term strategies.

Mission: To protect, restore, and enhance wetland ecological functions and values for multiple ecological and social benefits based on sound scientific principles and effective management practices.

Vision: To be a national leader in wetland conservation by using an adaptive framework and strong partnerships to meet the needs of wetland plants and animals, to garner public awareness and support for wetlands, and to promote recreational uses of these valued habitats.

Guiding principles:

1. Wetlands are valuable components of Missouri landscapes, but most have been lost and all have been altered. Wetland habitats sustain high biodiversity, production, and ecological functions that are critical for wetland plants and animals, social benefits, and public use opportunities.
2. Landscape alterations have led to extensive loss and degradation of Missouri wetlands. Successful conservation of wetlands will require acquisition, protection, restoration, enhancement, and management actions.
3. An integrated approach that seeks multiple benefits while identifying tradeoffs is needed to achieve desired ecosystem services, habitat and population objectives, and quality recreational experiences.
4. Long-term wetland conservation planning must adapt to new challenges posed by climatic, environmental, political, and societal changes.
5. The waterfowl hunting community has played a leading role in supporting and implementing wetland conservation programs in Missouri; thus, the tradition of waterfowl hunting will continue as an important component of wetland conservation and management.
6. Water stewardship, scientific research and monitoring, information sharing among wetland managers and researchers as well as the public, and advocacy for wetland conservation are

critical if we are to ensure continued support, understanding, and protection of wetland systems and their values.

7. Implementation actions will clearly link objectives, goals, strategies, and monitoring to promote trust, learning, understanding, and management effectiveness.

Ecological and Social Goals: Their Interdependence and Significance

This Initiative identifies six goals that address both ecological and social considerations. Success will be achieved by working toward all goals concurrently because they are related and interlinked (Figure 3).

The first three goals focus on physical and biological linkages within stream-floodplain-watershed systems. These goals explicitly acknowledge the ecological services delivered by wetlands such as contributions to clean water, providing localized flood relief, storing and cycling carbon and nutrients, and providing habitats for fish and wildlife. A focus on watersheds and system processes (Goal 1) provides the ecological context for determination of wetland habitat potential (Goal 2). An understanding of habitat potential informs decisions about management that will benefit the plants and animals adapted to these diverse habitats (Goal 3).

Similarly, the last three goals focus on linkages at various scales within social systems.

Achievements of partners working together (Goal 4) will provide opportunities for friends, families, and communities to interact with each other and nature in the special settings provided by wetlands.

Shared experiences and collaborations create an atmosphere where citizens develop an appreciation for these remarkable

places. These, in turn, lead to a community of citizens who embrace a conservation ethic and advocate for wetlands and the experiences they allow (Goal 5). Citizens who embrace a shared stewardship ethic and identify themselves as conservationists, hunters, anglers, and naturalists will introduce other citizens to wetland recreation and conservation (Goal 6). Wetland management success in Missouri hinges on recognition of the interdependence of ecological and social goals and the need to pursue them concurrently.



Figure 3. The integration of ecological and social goals is necessary to sustain benefits from wetland systems.

Goal 1. Functioning Watersheds Maintain and improve ecological functions of Missouri stream-floodplain-watershed systems by integrating wetlands within lands that can include agriculture, businesses, and communities.

Wetlands play crucial roles in sustaining ecological functions of Missouri's stream-floodplain-watershed systems. Wetlands improve stream and lake water quality by filtering sediments and nutrients from flood waters. They improve watersheds by slowing and filtering precipitation runoff from surrounding lands, eventually recharging streams, lakes, and groundwater. By slowing and filtering runoff, wetlands also contribute to reductions in flood heights, improve water quality, capture carbon, and cycle nutrients.

Wetland plant, fish, and wildlife species help sustain other ecological functions of stream-floodplain-watershed systems. Wetland habitats produce leaves, stems, branches, and roots that are sources of organic matter available for transport to other parts of a watershed. Wetlands produce a variety of food resources that help support plant and animal populations living in streams and on adjoining floodplains and uplands. Wetlands also help support many birds, bats, and insects that play important roles in pollinating and providing pest control for native plants and crops on surrounding lands.

Many of the functions wetlands provide for stream-floodplain-watershed systems result from hydrologic connectivity between streams and their floodplains. However, stream diversions, levees, dams, channelization and ditching, and urbanization and other land use changes have dramatically altered stream hydrology and channel characteristics in many river systems. These changes have resulted in the alteration or loss of wetland habitats and connectivity, reducing or eliminating the exchange and filtering of water, sediments, nutrients, and carbon and limiting the roles wetlands serve in slowing and filtering precipitation runoff and reducing flood heights.

The loss of connectivity between wetlands and streams, as well as between wetlands and surrounding uplands, has a profound effect on wildlife. Flood control and drainage modifications can disrupt the ability of fish and other aquatic species to access floodplain wetlands at crucial points in their life cycle. Many species of amphibians need wetlands accessible from nearby uplands to complete their annual life cycles. Amphibians and other wildlife species require vegetative cover or corridors to travel safely between wetlands and surrounding uplands.

Future management will require approaches that enhance the overall quality of stream-floodplain-watershed systems through strategic placement, design, and restoration of wetlands that create and enhance connectivity with streams, floodplains, and uplands. The Department will work with partners on development of new wetlands, enhancement of existing wetlands, and restoration efforts that range from local community watershed projects to big river restoration, all while recognizing the social and economic implications that must be considered. Together, the Department and partners will identify locations to enhance connectivity between streams and wetlands, restore shallow water habitat within stream channels, reduce storm water runoff and flood heights, and improve water quality and other benefits of functioning watersheds.

Goal 2. Healthy Wetlands A diversity of habitats to meet the life history needs of wetland plants and animals, to support a variety of recreational experiences, and to provide ecological services beneficial to society.

Missouri has experienced some of the highest rates of wetland loss in the nation, with only 13% of the state's original 4.8 million acres of wetland habitat remaining. The loss is greater for some wetland types than others. For instance, only small, fragmented stands of bottomland hardwood forests exist in southeast Missouri where these forests once dominated the landscape. Similarly, less than one percent of Missouri's wet prairie habitat remains. In-channel habitats in both the Missouri and Mississippi rivers have diminished significantly and few shallow lakes and oxbows remain in their floodplains.

Missouri's wetlands face an uncertain future due to the increasing pace and magnitude of environmental, social, and economic change. Growth of world and Missouri populations is leading to more intensive land and water use, and a changing agricultural economy has the potential to place more land under production. Considerable uncertainty now exists regarding a changing climate and if or when it may affect Missouri's precipitation patterns and stream flow regimes that historically sustained wetlands. Consequences of altered temperature and weather patterns may include a disconnect between timing of resource availability and wetland species' life history events, a shift by wintering migratory birds northward to Missouri, and/or a lack of sufficient wintering habitat to accommodate higher numbers of wintering birds.

Wetland conservation decisions will require that the Department and partners strategically consider where to concentrate wetland restoration efforts. These types of decisions have been successfully made in Missouri, and the Department and other wetland management agencies and organizations have been leaders in pursuing innovative wetland habitat restoration opportunities. To date, partnerships have acquired \$117 million through the North American Wetlands Conservation Act (NAWCA) to restore and improve over 97,000 acres of wetland habitat, while private and public landowners have restored over 150,000 wetland acres through the United States Department of Agriculture's (USDA) Wetlands Reserve Easement (WRE) program (Appendix A). After the large floods of the 1990s, partners also restored additional wetland habitat within the channels and on the floodplains of the Missouri and Mississippi rivers after purchasing damaged lands from willing sellers.

Partnerships, particularly in the context of changing ecological and social landscapes, now have opportunities to build on recent wetland successes, consider how to most effectively manage these acres, and identify additional habitat needs. This will require identification of habitat potential based on current stream-floodplain-watershed system conditions. In locations where less alteration has occurred, a passive management style may be the best approach. Where system alterations like levees and dams have altered the magnitude, duration, and timing of wetland inundation, more intensive management may be needed to mimic the natural processes that once existed. An intensive approach will likely require water management infrastructure, water pumping, and various forms of vegetation manipulation such as prescribed fire, disking,

and chemical control to emulate natural processes and to control invasive and exotic species. In some cases, it may be necessary to simply focus on providing critical resources to wetland-dependent species. In all cases, it will be important to develop and manage for wetland systems that are robust to outcomes created by a changing climate and other alterations.

Goal 3. Thriving Plants and Animals Resilient populations of wetland-dependent plants and animals that support high-quality recreational experiences and other social and ecological benefits.

The loss of wetlands and the alterations that impair their function and quality have negatively affected Missouri's wetland-dependent plants and animals. Habitat degradation has facilitated the expansion of some invasive and exotic species. These aggressive species have altered food webs and dominated communities such that native species diversity and habitat quality of remaining wetlands have significantly declined.

Wetland-dependent species have responded positively to previous wetland restoration efforts in Missouri. Today, wetlands along the Mississippi and Missouri rivers and their tributaries are recognized for their continental significance to waterfowl, water birds, and land birds. Recent research has shown that efforts to restore connectivity to floodplains have also been beneficial to specific riverine fish species. Other research shows that certain amphibian species are using and successfully recruiting young on newly created WRE wetlands. The National Audubon Society's Important Bird Area program in Missouri has formally recognized most of the Department's intensively-managed wetlands as important birding areas, highlighting the importance of these wetlands to a diversity of bird species.

Previous restoration efforts in Missouri have helped establish a new benchmark for duck use of wetlands in Missouri. State and federal refuges in Missouri now regularly support nearly 40 million duck-use days compared to an average of less than 10 million duck-use days during the drought period of the 1980s. An even more remarkable comparison with today's duck use is to the approximate 20 million duck use days that occurred during the 1970s when continental duck populations were high and served as the previous benchmark.

Future population management of wetland-dependent species in Missouri will require understanding in three important areas. First, requires identification of the key life history events that occur while wetland-dependent species are in Missouri. Second, requires determination of the wetland habitat conditions needed by these species to successfully complete these events. Third, requires identification of limiting factors that likely influence the conservation status of each species. As these steps are accomplished for individual species or species guilds, the Department will coordinate with partners to provide the necessary habitat in appropriate stream-floodplain-watershed system settings to overcome identified limiting factors and improve population status.

Goal 4. Strong Partnerships Citizens, landowners, communities, conservation organizations, and government agencies working together to support wetland conservation and the continued use and enjoyment of these diverse habitats.

Wetland conservation depends on support and advocacy from the conservation community and individual citizens. However, wetland enthusiasts' demographics are changing. State and federal program and funding priorities often shift. These changes highlight the need to maintain and grow the capacity for wetland conservation through partnerships.

Missouri's past successes in wetland conservation have been built on a foundation of collaboration and coordination with partners and citizens. Wetland partnerships range from local initiatives such as Conservation Opportunity Areas, state partnerships like the Missouri Bird Conservation Initiative, regional partnerships such as the Joint Ventures and Landscape Conservation Cooperatives, continental partnerships like the Mississippi Flyway Council, and western hemisphere partnerships like Partners in Flight (Appendix B). Successes also involve partnerships that promote wetland conservation on private lands as exemplified by Wetland Emphasis Teams, a collaboration of the Department and USDA Natural Resources Conservation Service (NRCS) staff working with landowners interested in WRE and other wetland conservation activities.

The Department continues to strengthen existing partnerships and look for opportunities to establish new ones that promote conservation and the use and enjoyment of wetland resources. This includes working with partners to encourage, assist, and enable conservation actions that mirror priorities in this Initiative. The effort also includes providing funding and technical assistance to help partners increase their ability to implement wetland conservation actions and support broader stream-floodplain-watershed initiatives.

Goal 5. A Shared Conservation Ethic A conservation ethic that is shared by citizens, reflected in the identities of individuals and communities, and founded on the appreciation of healthy, abundant, and diverse natural resources.

In this Initiative, we advocate advancement of a shared conservation ethic where people value the benefits that wetlands provide and enjoy interactions with one another and nature in the special settings provided by wetlands. This Initiative challenges scientists, managers, and partners to inspire communities and individuals to embrace an ethic that fosters continued support for conservation and recruits new individuals to wetland-related activities.

Goal 6. Engaged Citizens Citizens actively engaged in wetland-related recreation and wetland conservation and a general public that supports the social and ecological benefits provided by wetlands.

A rapidly changing social environment has led to concern about the growing divide between nature and society. This divide is reflected by declining participation in many forms of outdoor recreation nationwide, including waterfowl hunting. Traditionally, waterfowl hunters have provided the greatest support for wetland conservation through purchase of licenses, permits, and Migratory Bird Hunting and Conservation stamps, as well as by joining and volunteering time to conservation organizations that support wetland restoration and management.

Waterfowl hunter numbers in the United States and Canada have declined by 46% since the early 1970s. Missouri waterfowl hunter numbers, however, have not reflected this national trend and their numbers have slightly increased during this period. It is uncertain if Missouri waterfowl hunting will begin to follow the patterns of decline experienced by other hunting activities in Missouri. Our ability to maintain support from waterfowl hunters while expanding the wetland conservation base with other citizens remains unclear.

With this Initiative, the Department and partners have opportunities to influence participation and public engagement through improved habitat management, plant and animal population management, recruitment and retention efforts, outreach, and education. A variety of recreational opportunities is provided by managing for diverse wetland habitats and populations. Recruitment and retention will require a better understanding of the factors that motivate people to participate in conservation, to identify with a specific tradition, and to support conservation programs. Outreach and education efforts will focus on creating awareness and developing an understanding of the social and ecological benefits of wetlands, building public support, and fostering trust in Department decisions and activities.

Guidelines for Implementation

The Initiative establishes a holistic plan that employs three primary guidelines to implement and, ultimately, achieve its goals. These guidelines describe the processes that will help shape the Department's wetland management philosophy. These processes include thinking from both ecological and social systems perspectives, using decision analysis approaches for challenging decisions, and enhancing coordination and collaboration with partners, all to improve wetland conservation activities across multiple scales.

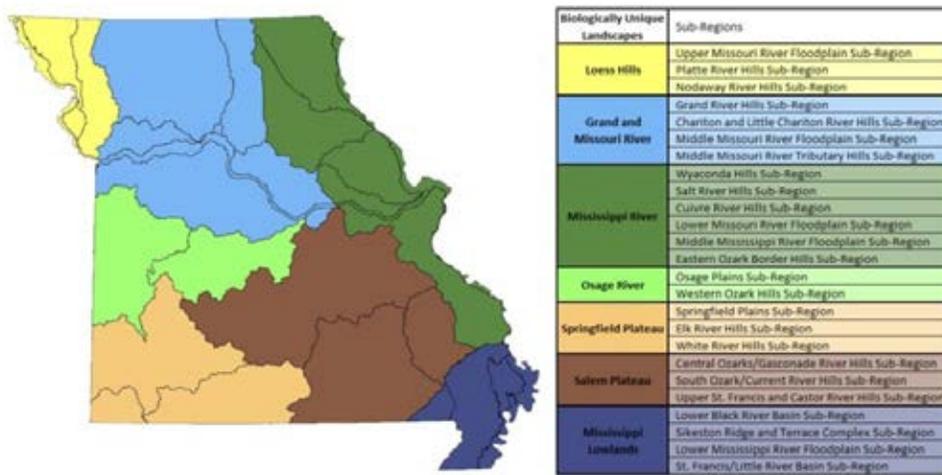
A Systems Perspective

A systems perspective incorporates ecological and social components. Key ecological elements of stream-floodplain-watersheds systems include soils, plants, and animals and processes such as stream flow, precipitation, and water runoff. Key elements of the social systems include how individuals, communities, and organizations interact with one another and influence land and water use, support for wetland conservation, and participation in wetland-related recreation.

A systems perspective emphasizes management actions that work with the functions, processes, and relationships within and between components. Outcomes with benefits to all components are preferred to approaches focused on a single desired outcome without considering

effects on other parts of the system. A systems perspective considers opportunities to integrate wetlands into surrounding lands and add value to the families, businesses, user groups, and communities that use these lands, while retaining the integrity and functions of the natural resources of the region.

This Initiative facilitates a systems perspective by defining seven geographic regions, each comprising specific characteristics based on landforms, soil properties, and hydrology. The seven regions are further subdivided into 25 sub-regions based on hydrogeomorphic characteristics (Figure 4). These regions and sub-regions set the ecological foundation needed to identify the appropriate settings in which to manage for a range of wetland functions and habitats. Chances for success in restoring wetland functions and values increase by considering current hydrology and surrounding land use.



Ecological Divisions For Missouri's Wetlands

Figure 4. Missouri can be divided into seven wetland ecological regions with 25 subregions based on specific hydrogeomorphic characteristics.

The Initiative also facilitates a systems perspective by calling attention to the social factors and processes influencing land and water use, support for wetland conservation, and participation in wetland conservation. Achieving wildlife management objectives and sustaining public use and support for wetland conservation will require a broader perspective - one that considers the importance of public and private wetlands and how, in combination, they can provide benefits to both the public and private landowners.

Identifying and strengthening the connections between recreation and appreciation of wetlands is critical to future successes in wetland conservation. Today, fewer people are participating in outdoor recreation and the individual motivations for active support are less certain. The Department will need better understanding of individual motivations, the interactions among individuals and groups, and connections supported and provided by wetland conservation organizations and partnerships.

Decision Analysis

New decision-making approaches and tools are available to assist with blending the art and science of wetland conservation. These approaches include new ways to record and use information when making routine decisions. They also include adaptive approaches to difficult decisions involving significant uncertainty, and using other structured decision-making methods to select optimal management actions for achieving multiple objectives. Not every decision will involve using all of these approaches. Instead, emphasis will be placed on matching appropriate approaches to decisions that will lead to desired outcomes.

Routine Decisions

Wetland management is an art that benefits from the knowledge that managers gain through experience. Information technology provides new possibilities to capture this experiential knowledge. Managers now have the tools to record and store information in formats that are much more accessible in the field and that can more easily be shared with others, including future generations of managers. This Initiative will facilitate the exploration of new ways to use information technology to improve management decision outcomes and transfer knowledge among managers.

Difficult Decisions with Significant Uncertainty

Wetland management also is a science. Ecological theory and scientific methods contribute to our understanding of wetland system dynamics. Adaptive resource management involves managers and scientists working together to identify sources of management uncertainty. Management experiments and research are conducted collaboratively to address identified uncertainties. This Initiative will guide the selection and implementation of adaptive management evaluations and research projects to begin reducing key uncertainties that limit effectiveness in achieving the ecological and social goals.

Decisions with Multiple Objectives

Wetland management is complex. Managers face difficult resource allocation choices within a culture of intense public interest. Structured decision-making approaches assess the consequences of alternative decisions and help select the option that will most likely achieve multiple objectives. This strategic approach to complex decision-making engages a wide range of stakeholders to identify potential consequences and provides a more transparent way to select optimal management strategies, particularly in the face of controversy. This Initiative will guide the selection and implementation of structured decision-making approaches to complicated decisions with the greatest public interest and to those with the most substantial costs associated with them.

Coordination and Collaboration across Multiple Scales

Goals of this Initiative will be more readily achieved through deliberate coordination with partners focused on fish and wildlife population management and stream-floodplain-watershed restoration at different scales, ranging from hemispheric down to the local scale. This includes

strengthening existing partnerships and recognizing opportunities for new collaborations (see Appendix B for partnership examples).

Future success in conserving Missouri's wetland resources will require the Department's participation in partnerships that work to manage habitat and fish and wildlife populations extending beyond Missouri's borders. Continued participation in partnerships that develop migratory bird plans, such as the North American Waterfowl Management Plan, Waterbird Conservation for the Americas, Partners in Flight, and the United States Shorebird Conservation Plan (see Appendix C) will benefit management efforts in Missouri. The Department's participation in partnerships focused on fish and wildlife populations of large river and watershed systems, including those focused on different segments, tributaries, and watersheds associated with the Mississippi and Missouri rivers, will likewise be necessary.

Deliberate coordination and collaboration will also be required within Missouri's borders. The Department, other agencies, and nongovernmental organizations are all involved in determining how Missouri can assist in achieving objectives identified in broad-scale plans for management of fish, wildlife, river, reservoir, and watershed management. This Initiative will help establish formal mechanisms within Missouri to facilitate the coordination of management activities that may apply to more than one of these planning efforts. Collaborative efforts will lead to the achievement of goals that apply both to fish and wildlife populations and those focused on rivers, reservoirs, and watersheds.

At wetland complex scales, increased coordination will allow managers to work together to identify collaborative management actions that benefit both local and larger stream-floodplain systems. Increased coordination within complexes will benefit fish and wildlife species that require an area larger than a single wetland to meet life history needs. These species often need a diversity of habitats in close proximity to one another as well as corridors that connect these habitats. Similarly, broad-scale management objectives for fish and wildlife that only use Missouri's wetlands for a portion of their life cycle will be more readily achieved through deliberate coordination within wetland complexes. Coordination at the wetland complex scale also will create opportunities to engage private wetland owners and include them in partnerships to accomplish mutual objectives. These partnerships may be informal groups that meet annually to discuss upcoming management plans, or formal partnerships with structured collaboration between public and private wetland managers. Engagement and partnering with private landowners and other wetland managers within a wetland complex may lead to novel approaches that accomplish shared management objectives.

Decision Categories

Wetland management effectiveness will be enhanced when the processes of incorporating a systems approach, applying decision analysis methods, and coordinating wetland conservation activities across multiple scales are applied to key decisions. Many decisions can be placed into six broad categories including water stewardship, infrastructure and maintenance, habitat management, population management, landscape and watershed planning, and public

engagement. These decisions often have ramifications for multiple goals and objectives. Several also are made on a repeated basis and, thus, offer opportunity to learn from outcomes of previous decisions.

Water Stewardship

Water is the lifeblood of Missouri's wetlands. Successful long-term management of public and private wetlands is dependent on responsible, sustainable stewardship of water. The challenge of water stewardship is in balancing competing water resource needs for public water supply, agriculture, industry, wetland management, and the conservation of aquatic plants and animals and their habitats.

The Department faces difficult internal decisions on water use to achieve multiple conservation objectives. Such decisions are particularly difficult when objectives include meeting both the needs of plants and animals in streams and in wetlands when the full range of habitats are no longer available due to wetland loss and altered stream characteristics. These challenges are further compounded by increased public water demand and more intensive land use.

Department decision and policy makers will routinely evaluate the Department's water use and management decisions. Staff will strive for a balance among water uses while maintaining healthy ecological processes in streams and wetlands. Integration of varied perspectives from Department staff as well as collaboration with partners at multiple scales will guide decisions and build consensus about water stewardship.

Infrastructure and Maintenance

Natural wetlands in much of Missouri occurred as a result of fluvial processes that shaped stream channels and the topography of floodplains. The result was a complex of diverse floodplain habitats with a wealth of fish and wildlife. Today, these fluvial processes are bounded by man-made structures to control flow and minimize or eliminate flooding to protect farms, homes, and infrastructure in these highly-altered landscapes. Incidental to this control has been the loss of most of Missouri's former wetland diversity and extent.

Wetland restoration, enhancement, and management often require the establishment, maintenance, and manipulation of infrastructure. Infrastructure includes pumps to provide water that may no longer be available through natural processes of runoff and flooding; low-profile levees designed to retain water after flood water recedes; flood protection levees designed to keep water away from particular sites; water control structures to facilitate the movement of water in and out of wetlands; flood spillways to protect infrastructure from major flood events; and roads, parking lots, and other conveniences that support public use.

Additional investment in infrastructure will be necessary for wetland restoration in most parts of the state, due to highly-altered landscapes. Floodplain wetlands were once created by shifting stream channels that moved across floodplains leaving abandoned channels, oxbow lakes, and depressions. The scouring and deposition that occurred during flood events also created and sustained these habitats. Landscape alterations have changed how stream channels shape the

floodplain and how flooding occurs in terms of timing, height, and duration. Shifting stream channels and flood heights that once were beneficial to wetlands now can result in extensive scouring, head-cutting, and excessive sediment deposition as well as significant damage to private land. Therefore, investment in and continued maintenance of infrastructure are often needed to provide wetland habitat and public use opportunities while helping to protect landowners and their property.

Habitat Management

Habitat management decisions include an analysis of the most

appropriate habitats for a given site and the most effective methods to match management actions to site characteristics. Potential wetland habitats include bottomland forests, woodlands, scrub-shrub, early succession wet prairie, late successional wet prairie, robust emergent perennial vegetation, annual vegetation, aquatic vegetation, and mudflats. Depending on site location and the degree of historical alterations, management intensity will vary from passive management to intensive, active management (Figure 5). In cases with the least wetland alteration, the best option is likely to protect or restore system functions, whereas sites that have experienced a higher degree of alteration might best be served by emulating natural processes within the limits of the system. In the most extreme cases, it only may be possible to manage habitat such that some critical resources are provided for wetland-dependent species.

Wetland managers have opportunities and responsibilities to learn from one another and to pass this knowledge on to their successors. A deliberate decision-making approach will accelerate learning by integrating knowledge and experiences from managers and researchers alike. Managers are able to more effectively communicate management intentions to other managers and the public by articulating tradeoffs involved when making habitat management decisions and developing explicit objectives. Determining management outcomes by using standardized monitoring across areas allows managers to share results with one another and to coordinate the use of adaptive management techniques to address uncertainties.

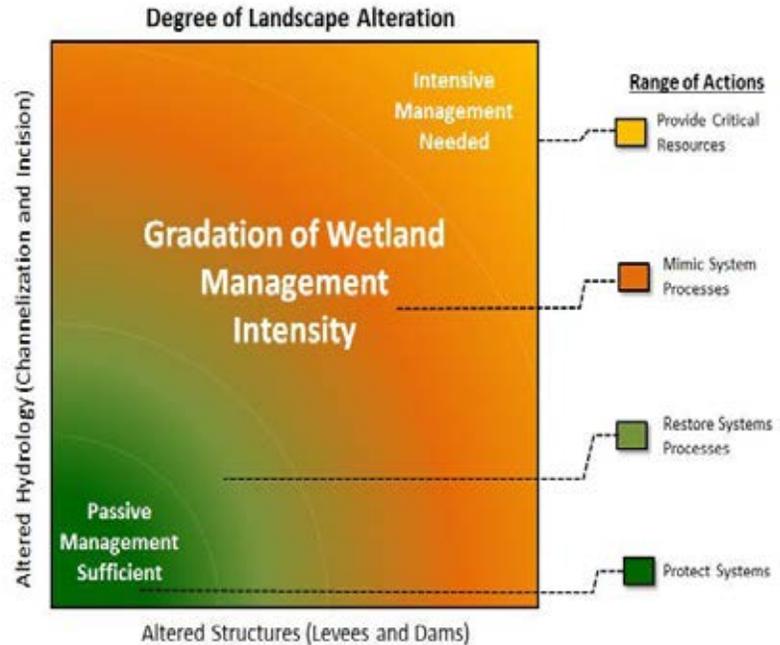


Figure 5. The alterations to the physical structure and hydrology of Missouri’s landscape influence the range of conservation strategies that might be appropriate to protect, restore, or mimic system processes. Sometimes the only solution is to provide critical resources for certain species because of the high degree of alteration.

Population Management

Decisions for wildlife population management include habitat management, land protection, and land acquisition to sustain wetland-dependent species; harvest regulation recommendations for waterfowl, rails, and coots; management of human disturbance; and reduction of potential disease effects. Population management decisions that involve hunting regulations aim to achieve multiple objectives, including sustaining populations at desired levels while providing hunters with quality hunting experiences.

Some population decisions also involve consideration of citizen opinions. For example, Canada geese are enjoyed by many citizens for hunting or viewing. However, local populations, particularly in urban settings, can large enough to become a nuisance. In these cases, citizen involvement in the decision-making process is critical.

Landscape and Watershed Planning

Landscape and watershed planning includes identifying priority areas for creating or expanding upon existing public and private wetland complexes to achieve Initiative goals. Planning should be in concert with larger efforts, such as the Comprehensive Conservation Strategy. Planning decisions should focus on identifying the best locations within these landscapes and watersheds to achieve plan goals through the acquisition, protection, restoration, enhancement, and management of wetlands. Targeting conservation efforts in priority wetland areas requires coordination with partners, particularly private landowners, to identify landscapes and watersheds that offer the most potential to provide the ecological and social benefits of wetlands.

Public Engagement

Public engagement decisions work to foster awareness, support, and the recruitment and retention of participants in wetland-associated recreation such as angling, birding, hunting, wildlife viewing, photography, and trapping. Like the Department, many nongovernment organizations are involved in efforts to encourage the public to participate in wetland conservation and wetland-associated recreation. However, these efforts frequently do not include monitoring to identify approaches that are most effective.

The Department will engage partners to strategically identify appropriate public engagement activities and to enhance coordination that avoids duplication of efforts among partners. This approach provides opportunities to develop a shared framework of understanding of what has the greatest influence on public engagement in Missouri and to more deliberately target actions to achieve objectives. Engaging partners also provides opportunities to enhance Department-branded communication, education, and outreach programs that introduce individuals to wetland-associated recreation and conservation.

Conclusion

The Wetland Planning Initiative recognizes that ultimate success will depend on garnering more participation in wetland conservation and fostering increased awareness and support for the

many benefits provided by wetlands. This effort reflects the Department's responsibility to all Missourians to protect and manage our vitally important forest, fish, and wildlife resources. As with all Department activities, the Initiative seeks innovation and efficiency, working with partners and conservation-minded citizens, and recognizing the importance of conserving plants, animals, and their habitats for broad public use and enjoyment.

This Wetland Strategic Guidance Document, as part of the Initiative, provides the philosophical backdrop, goals, guidelines, and decision categories that the Department will use to implement wetland conservation in Missouri. Ultimately, ecological goals are intended to sustain thriving populations of plants and animals in healthy wetlands embedded within functioning watersheds. The Department recognizes the need for concurrent work to meet goals that address a rapidly changing social landscape. Achieving the social goals set here will help partners and citizens develop a shared conservation ethic to further support wetland conservation and strengthen the ties between society and nature.

Appendix A. Federal programs mentioned in this Initiative that support and fund wetland conservation.

Program	History	Purpose
The North American Wetlands Conservation Act of 1989	The Act was passed, in part, to support activities under the North American Waterfowl Management Plan, an international agreement that provides a strategy for the long-term protection of wetlands and associated upland habitats needed by waterfowl and other migratory birds in North America.	Provides matching grants to organizations and individuals who have developed partnerships to carry out wetlands conservation projects in the United States, Canada, and Mexico for the benefit of wetlands-associated migratory birds and other wildlife.
Wetlands Reserve Easement (WRE)	<p>The USDA NRCS provides technical and financial support to help landowners with their wetland restoration efforts through WRE.</p> <p>This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection.</p> <p>Older projects were formerly enrolled in the Wetlands Reserve Program or WRP in a previous Farm Bill and have since been included as WRE.</p>	<p>WRE is a voluntary program that offers landowners the opportunity to protect, restore, and enhance wetlands on their property.</p> <p>The goal of NRCS is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program.</p>

Appendix B. Wetland partnerships occur at different scales ranging from local initiatives to efforts at a hemisphere scale. Below are examples of partnerships that involve the Department, the scale at which they operate, the background and purpose of the group, and contributions to wetland conservation.

Partnership	Scale	Background	Purpose	Contributions
Conservation Opportunity Area (COA)	Local	Thirty-three COAs were identified by teams of partners who developed a common vision of issues and actions. COA profiles are collected in a publication, <i>Conserving All Wildlife in Missouri: A Directory of Conservation Opportunity.</i>	Articulated management strategies to conserve wildlife populations and the natural systems on which they depend. Included as part of Missouri’s State Wildlife Action Plan, developed as result of a request from Congress to each state.	The framework of COAs can be used by the Department, other public agencies, private conservation organizations, and citizen conservationists to focus efforts for species of conservation concern and their habitats.

Partnership	Scale	Background	Purpose	Contributions
Missouri Bird Conservation Initiative (MoBCI)	State	A partnership of organizations that “get excited about birds,” have a stake in bird conservation, and/or have formal legal responsibilities for bird conservation.	The MoBCI is Missouri’s “step down” from the North American Bird Conservation Initiative (NABCI). MoBCI is a partnership concerned with conserving birds across geopolitical boundaries, across taxonomic groups, and across landscapes; however, it is designed for delivery of conservation at the state and local levels.	MoBCI’s primary purpose is to work together to conserve, restore, and protect bird populations.

Partnership	Scale	Background	Purpose	Contributions
Joint Venture (JV)	Regional	A JV is a collaborative, regional partnership of government agencies, non-profit organizations, corporations, tribes, and individuals that conserves habitat for priority bird species, other wildlife, and people.	<p>Nationwide, 18 habitat-based JVs address the bird habitat conservation issues found within each geographic area. Additionally, three species-based JVs, all with an international scope, work to further the scientific understanding needed to effectively manage specific bird species.</p> <p>Missouri is included in and represented by three JVs: the Upper Mississippi River/Great Lakes, Central Hardwoods, and Lower Mississippi Valley.</p>	<p>JVs have a 25-year history of success in leveraging public and private resources to bring together partners and focus on regional conservation needs.</p> <p>Since the first JV was established in 1987, these partnerships have leveraged Congressional funds 36:1 to help conserve 20.5 million acres of critical habitat for birds and other wildlife.</p>

Partnership	Scale	Background	Purpose	Contributions
Landscape Conservation Cooperative (LCC)	Regional	LCCs are public-private partnerships that provide the expertise needed to support conservation planning, implementation, and evaluation at landscape scales.	<p>LCCs generate the tools, methods, and data that managers need to carry out conservation using the Strategic Habitat Conservation approach. They also promote collaboration among their members in defining shared conservation goals.</p> <p>The 22 regional LCCs serve as forums for partnerships that allow a region's private, state, and federal conservation infrastructure to operate as a system rather than independent entities.</p>	LCCs promote the exchange of plans, coordination of activities, and leveraging of resources among conservation partners so together they can create landscapes capable of supporting self-sustaining fish and wildlife populations for current and future generations.

Partnership	Scale	Background	Purpose	Contributions
Mississippi Flyway Council	Continental	The U.S. Fish and Wildlife Service and its partner agencies manage for migratory birds based on specific migratory route paths within North America (Atlantic, Mississippi, Central, and Pacific). Based on those route paths, state and federal agencies developed the four flyways that administer migratory bird resources.	Each flyway has a council, consisting of representatives from state and provincial agencies. These councils serve to direct the hunting regulations process. The councils are advised by flyway technical committees consisting of state and provincial biologists who evaluate species and population status, harvest, and hunter-participation data. Missouri is a member of the Mississippi Flyway Council.	The flyway councils and technical committees are involved in many aspects of migratory game bird management, including development of recommendations for hunting regulations and assisting in research and habitat management activities. Some of the waterfowl hunting regulations that are set each year, including season length and daily bag limits, are specific to these individual flyways.

Partnership	Scale	Background	Purpose	Contributions
North American Bird Conservation Initiative (NABCI)	Continental	The NABCI vision is one where “Populations and habitats of North America’s birds are protected, restored, and enhanced through coordinated efforts at international, national, regional, state, and local levels, guided by sound science and effective management.”	The NABCI Committee is a forum of government agencies, private organizations, and bird initiatives helping partners across the continent meet their common bird conservation objectives.	The Committee's strategy is to foster coordination and collaboration on key issues of concern, including bird monitoring, conservation design, private lands, international collaboration, and state and federal agency support for integrated bird conservation.
Partners in Flight (PIF)	Hemispheric	Formed in 1990 in response to concerns about declines in the populations of many land bird species, The partnership represents dozens of leading conservation organizations in North, Central, and South America.	PIF is a collaborative effort that links the countries of the Western Hemisphere to help species at risk and keep common birds common through voluntary partnerships.	

Appendix C. Wetland partnerships have collaborated to write conservation plans with population and habitat goals identified at different scales ranging from local to hemispheric. Below are examples of plans with goals that could potentially be stepped down to Missouri.

Plan	Mission	Vision	Goals
2012 North American Waterfowl Management Plan – People Conserving Waterfowl and Wetlands	Sustaining the continent’s rich waterfowl fauna	People Conserving Waterfowl and Wetlands	<ul style="list-style-type: none"> • Abundant and resilient waterfowl populations to support hunting and other uses without imperiling habitat. • Wetlands and related habitats sufficient to sustain waterfowl populations at desired levels, while providing places to recreate and ecological services that benefit society. • Growing numbers of waterfowl hunters, other conservationists and citizens who enjoy and actively support waterfowl and wetlands conservation.

Plan	Mission	Vision	Goals
The North American Waterbird Conservation Plan		The distribution, diversity, and abundance of populations and habitats of breeding, migratory, and nonbreeding waterbirds are sustained or restored throughout the lands and waters of North America, Central America, and the Caribbean.	<ul style="list-style-type: none"> • Ensure sustainable distributions, diversity and abundance of waterbird species throughout each of their historical or naturally expanding ranges in the lands and waters of North America, Central America, and the Caribbean. • Protect, restore, and manage sufficient high-quality habitat and key sites for waterbirds throughout the year to meet species and population goals. • Ensure that information on the conservation of waterbirds is widely available to decision-makers, land managers, the public and all whose actions affect waterbird populations and their habitats. • Ensure that coordinated conservation efforts for waterbirds in the Americas continue, are guided by common principles, and result in integrated and mutually supportive waterbird conservation actions.
Partners In Flight – North American Landbird Conservation Plan	Helping species at risk, keeping common birds common, and voluntary partnerships for birds, habitats, and people.	Populations of native birds will occur in their natural numbers, natural habitats, and natural geographic ranges through coordinated efforts by scientists, government, and private citizens.	<ul style="list-style-type: none"> • Ensure an active scientifically-based conservation design process that identifies and develops solutions to threats and risks to landbird populations. • Create a coordinated network of conservation partners implementing the objectives of landbird conservation plans at multiple scales. • Secure sufficient commitment and resources to support vigorous implementation of landbird conservation objectives.

Plan	Mission	Vision	Goals
United States Shorebird Conservation Plan		To ensure that stable and self-sustaining populations of all shorebirds are distributed throughout their range and diversity of habitats in the U.S. and across the western hemisphere, and that species which have declined in distribution or abundance are restored to their former status to the extent possible at costs acceptable to society.	<ul style="list-style-type: none"> • Restore and maintain stable and self-sustaining populations of all species of shorebirds in the Western Hemisphere. • Stabilize populations of all shorebird species known or suspected of being in decline due to limiting factors occurring within the U.S., while ensuring that stable populations are secure. • Provide sufficient high-quality habitat to ensure that shorebirds in each region are not unduly limited by habitat availability or configuration. • Ensure that efforts to provide habitat for shorebirds are integrated into multiple species habitat management initiatives where appropriate. • Increase understanding of how local habitat conditions affect shorebird abundance and use of a region and, in turn, how conditions affect hemispheric shorebird populations.