

Statewide Strategies for Wetland and Riparian Conservation

Strategic Plan for the Wetland Wildlife Conservation Program

***Terrestrial Habitat Conservation Program
Terrestrial Section, Wildlife Programs Branch
Colorado Parks and Wildlife***



**Version 2.0
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Vision Statement

Through coordinated landscape-scale conservation actions, Colorado Parks and Wildlife and its partners will ensure that Colorado's wetland and riparian habitat is sufficient to support self-sustaining populations of desired wildlife species and to provide wildlife-associated recreation for future generations.

Purpose

*The Wetland Wildlife Conservation Program (Program) conserves wetland and riparian habitats and their ecological functions for the benefit of wildlife, **by planning and delivering conservation actions on a landscape scale.***

The Program facilitates voluntary, incentive-based conservation and management of priority wildlife species whose populations depend on wetlands or riparian areas in Colorado. This may be accomplished through protection of these habitats by easements or acquisition, or through habitat restoration, enhancement, and creation actions such as vegetation manipulation and water management.

Explanation of Plan Update

The Colorado Division of Wildlife's (CDOW) Wetlands Program was formed in 1997 (see Background and History section) but operated without a formal strategic plan until Version 1.0 was released in December 2008 (CDOW 2008a). Since that time there have been major organization changes within CPW. In September 2010, the terrestrial wildlife game and nongame sections were

merged into a single Terrestrial Section. As part of this internal merger, a new Terrestrial Habitat Conservation Program was formed, with the intent of strengthening the agency's habitat conservation functions. The new program adopted a science-based, landscape approach to habitat conservation, following the Strategic Habitat Conservation (SHC) model developed by the U. S. Fish and Wildlife Service (USFWS) and U. S. Geological Survey (USGS) (USFWS 2008). Four new habitat coordinators were hired in July 2011 to develop habitat conservation initiatives for the major biomes statewide. The Program now functions within this broader agency habitat conservation program. Further, in July 2011 the Colorado governor and legislature merged the former State Parks and Wildlife Divisions into a single Division within the Department of Natural Resources. Colorado State Parks (CSP) also housed habitat conservation functions, including wetlands (e.g., Peale 1996, CSP 2008b). Implications for the Program of these recent internal and external mergers are yet to be determined, but this plan update is timely and should facilitate internal communications about the Program.

In a partnership with the EPA, CPW and CNHP are collaborating on several aspects of wetland program development, and in December 2010 CNHP released its first Wetland Program Plan (Lemly 2010). This plan update describes those initiatives and highlights mutual priorities. Also, in April 2011 the partnership completed a major project to compile digital geospatial data regarding the type and location of wetlands in Colorado, and to assess the ecological condition of wetlands in the Rio Grande Headwaters basin (Lemly et al. 2011). This new information, partly described herein, enabled further development of this plan.

Consistent with the principles of adaptive management, this plan is intended to be dynamic. It will be updated as new information on priority wildlife species and their wetland and riparian habitats becomes available, to accommodate changes in strategic direction for habitat conservation, or as otherwise desired by CPW staff and partners. Interested users of this plan should check the CPW web site (<http://wildlife.state.co.us/LandWater/WetlandsProgram/>) for updates.

Definitions

Wetlands

"Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of the year" (Cowardin et al. 1979).

Wetland types include:

- Submerged aquatic (semi-permanent flooding with aquatic plants)
- Emergent marsh (seasonal or semi-permanent flooding)
- Wet meadow (high water table with grass/sedge/rush community)
- Shrublands and floodplains (seasonal flooding with shrubby vegetation)
- Peatlands/fens (flooded during growing season, low decomposition rate)
- Springs, seeps and sloughs (groundwater discharge site)
- Riverine (sand/gravel bars, other wetlands associated with stream channel)
- Playas (temporary lakes in pastures or prairies, flooded seasonally or less often)

- Lakes and reservoirs (included here because of their association with strategic wetlands and migratory waterfowl habitat)
- Artificial wetlands

Riparian Areas

“Riparian areas are those plant communities adjacent to and affected by surface or ground water of perennial or ephemeral water bodies such as rivers, streams, lakes, ponds, playas, or drainage ways. These areas have distinctly different vegetation than adjacent areas or have species similar to surrounding areas that exhibit a more vigorous or robust growth form.” (Definition used in CPW’s riparian mapping project; <http://ndis1.nrel.colostate.edu/riparian/riparian.htm>).

Program Background and History

CPW has a long history of working to improve wetland and riparian habitats. This work received a boost in the early 1990s with dedicated funding provided by the passage of the waterfowl stamp legislation (CDOW 2002). This work took a fundamental turn in 1997, when a Legacy Grant from the Great Outdoors Colorado (GOCO) Trust Fund in the amount of \$4.46 million provided a significant boost to a nascent cooperative venture between the CDOW and partners to target wetlands for conservation efforts. This marked the official launch of the Program.

Following this grant to the partnership’s Wetlands Initiative, initial conservation goals were rapidly exceeded (CDOW 2000). The Program successfully attracted additional funding from GOCO as well as annual commitments of CDOW funds to continue the program at its new level. In recent years, funding to the agency from GOCO has continued to be targeted to the Program, but at lower levels and through annual funds rather than GOCO’s Legacy Program (which involves multi-year commitments).

While funding sources remained in flux, the scope of the Program placed increasing emphasis on riparian habitats as well, which have many of the same attributes and functions as wetlands. The Program focus also was narrowed to habitat improvement projects, with habitat protection projects directed to the agency’s Habitat Protection Program which has far greater fiscal resources. Also in recent years as the Program has matured, CPW has held the projects funded through the Program to a higher standard of scrutiny – for their conservation values, competitive quality, reasonable cost, and compliance with principles of grant management.

The Program provides funding to the CPW’s staff and conservation partners (including private landowners), who collectively leverage CPW’s funding at a ratio of >1:1 with other funding such as the North American Wetlands Conservation Act, Farm Bill, etc.

Historically, habitat projects supported by the Program have occurred on either public or private land, with or without public access, depending on the particular benefits provided to wildlife and the public. There have been projects associated with public access (for example, to increase the public’s opportunity for waterfowl hunting) and projects that were not associated with access by the public (for example, on sites important for recovery of species). The dual focus of the program – on species associated with recreation and on species of conservation concern – necessitates

flexible requirements, suitable to meeting the objectives of specific projects in the context of the Program's overall goals.

Delivery of conservation projects has been and continues to be a strength of the Program. However, planning, monitoring, and evaluation were recognized as core functions of the Program since its inception (Ringelman 1996, Chappell 1997). These functions have been under-developed to date, and should receive greater emphasis (and funding) in the future to ensure that financial investments in habitat conservation are efficient and effective.

Program Need and Justification

Wetland and riparian habitats provide a broad diversity of benefits to society. For urban and rural communities, the benefits wetlands provide include hunting, fishing and wildlife viewing for a diversity of wildlife species, improving water quality and flood control, contributing to ground water recharge, and providing open space. They are particularly important to wildlife because they sustain a high level of biological diversity of plant and animal species, including habitat for waterfowl that are important for hunting recreation, as well as habitat for species that are imperiled and the focus of recovery efforts.

A high proportion of Colorado wildlife species use wetland and riparian habitats, many of which are imperiled. Of the 295 species of birds, 123 mammals, 47 reptiles, and 18 amphibians that inhabit Colorado at some time during the year, 125 (26%) can be classified as "wetland-dependent species" (Ringelman 1996). Within this category of "wetland wildlife", 98 species (78%) are migratory birds, 18 (14%) are amphibians, 6 (5%) are reptiles, 3 (1%) are mammals. CNHP has categorized 34% of these species (n=42; 29 migratory birds, 11 amphibians, 1 reptile, and 1 mammal) as "rare and imperiled" (CNHP 1995). Many additional species use wetland and riparian habitats for some portion of their life cycle, but are not considered wetland-dependent. Relatively speaking, the conservation of wetlands and riparian areas has a greater positive impact on the diversity and vitality of Colorado's wildlife populations than perhaps any other habitat conservation practice.

Perhaps not surprisingly, wetland and riparian habitats themselves are imperiled. Wetland acreage in Colorado has declined 50% in Colorado since European settlement, from approximately 2 million to 1 million acres (Dahl 1990), and habitat loss and degradation continue. Wetlands currently occupy only about 1.5% of the surface area of the state. These habitats face many threats, including residential, agricultural, transportation, and energy development, mining, timber harvest, hydrologic alterations, grazing management, invasive plants, and climate change. CNHP has recently developed a Landscape Integrity Model (LIM) for wetlands (Lemly et al. 2011; Figure 1). More than half of the land area of the state (51%) was classified in the severe, high, or moderate stress categories, and severe stress was indicated in regions important to the conservation of wetland-dependent wildlife (e.g., San Luis Valley, South Platte River corridor).

Finally, there is high public support for wetlands conservation. In a public survey commissioned by Great Outdoors Colorado (GOCO), respondents were asked to react to the statement "Wetlands are very important and should be protected by government". Fifty-five percent strongly agreed with the statement, and 28% somewhat agreed. Therefore, 83% of the public desires some form of wetland protection (Ciruli Associates 1995).

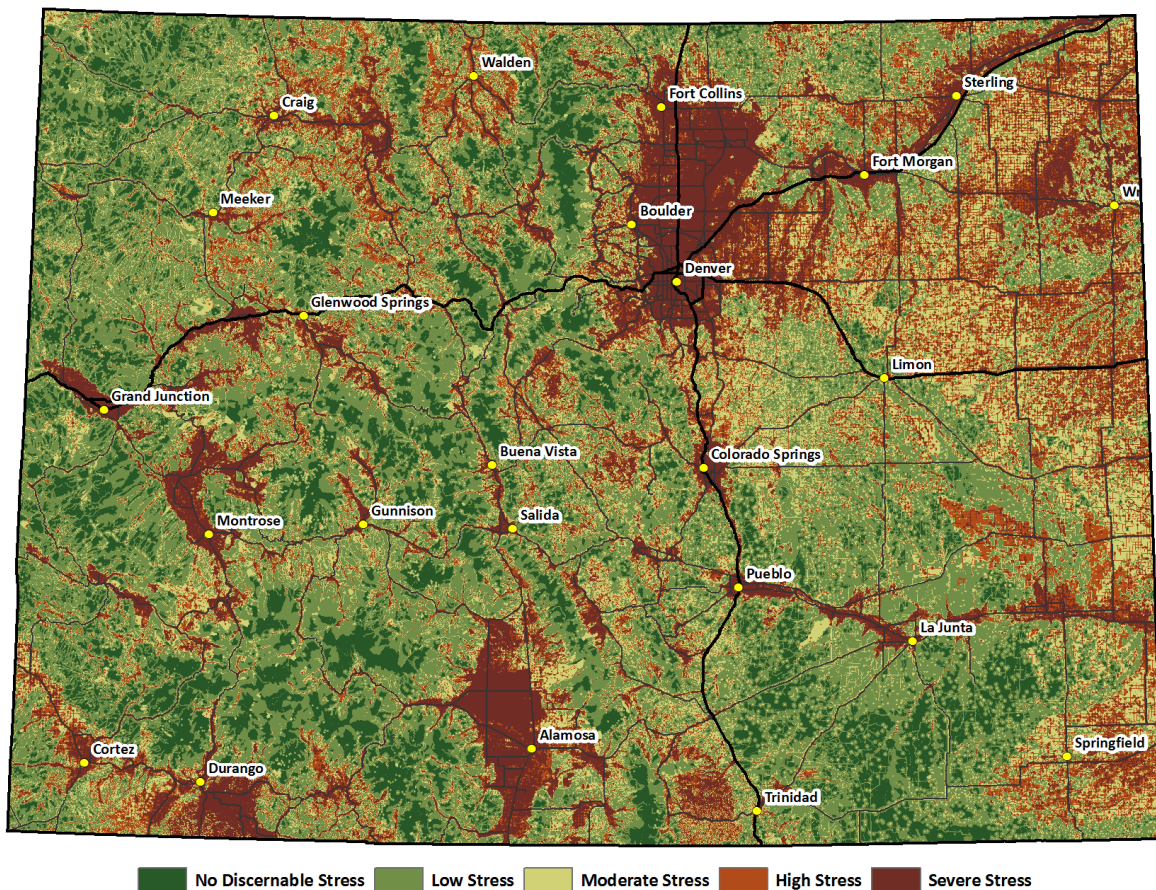


Figure 1. Wetland LIM developed for Colorado. Redder colors indicate higher stress and lower integrity; greener colors indicate lower stress and higher integrity. Black and gray lines on the map represent the interstate and state highway network.

Agency Priorities Addressed and Statutory Basis

By protecting, restoring, enhancing, and creating wildlife habitat, the Program directly addresses CPW's mission and the objective and desired outcomes for the ***Fish, Wildlife, and Habitat*** and ***Fish and Wildlife Recreation*** Program Areas (CDOW 2010).

The Wetlands Program is responsive to the public's concern over the quality of waterfowl hunting in Colorado. A number of recently completed and ongoing projects funded through the Program address the habitat recommendations of the Blue Ribbon Panel to improve waterfowl hunting quality along the South Platte River.

Statutory Basis

- C.R.S. 33-1-101 (1) authorizes programs for developing wildlife habitats.
- C.R.S. 33-4-102.5 authorizes the waterfowl stamp and artwork (see Funding section).

Program Investments and Accomplishments

Since its inception, the Program has protected, restored, enhanced, or created more than 270,000 acres of wetlands and associated uplands, and more than 700 miles of riparian habitat in more than 750 individual projects. CPW has invested approximately \$25 million in this work, and partners have invested an additional \$31 million (Stone 2011).

In Fiscal Year 2009-10, CDOW and its partners restored or enhanced more than 8,000 acres of wetland and riparian habitat and associated uplands, and CDOW granted \$1.7 million for new projects that will benefit 8 waterfowl species and 19 at-risk wildlife species, and will improve wildlife habitat and hunting opportunities on more than 20 State Wildlife Areas and other public lands.

Premises

1. Wetland and riparian areas provide important habitat for a diverse array of wildlife species. See Tables 1 and 2 describing Wetlands Program priority wildlife species, derived from data on waterfowl hunting in Colorado and Colorado's Wildlife Action Plan.
2. Wetland types vary throughout different geographical locations and climate, and their importance to wildlife species varies. Types of wetlands are listed in the Definitions.
3. Hydrological functions of wetlands are ecologically significant and socio-economically important to Colorado residents. Wetlands help sustain water flows in streams and rivers, recharge ground water supplies, act as temporary storage areas for flood water, and slow the flow of water allowing impurities to settle, thereby cleansing the water. Protecting hydrological functions conserves ecological integrity, and society benefits through economic savings.
4. The condition of upland habitats that buffer wetlands is associated with the integrity of adjacent wetlands. Adjacent upland habitats are also important to species of wildlife that only require wetlands for a portion of their annual life cycle.
5. A landscape strategy is effective in conserving healthy functioning wetlands and riparian habitats of all types.

Planning Approach and Plan Format

The emergence of new, complex conservation challenges over the last decade has spurred the development of a variety of new approaches to systematically plan, prioritize and implement conservation actions. Although the specific management systems vary across organizations and agencies, these approaches generally emphasize an adaptive management cycle of clear, measurable conservation goals; science-based design of conservation actions; efficient, coordinated delivery of conservation actions; and monitoring to measure results and inform adaptive management. This approach has emerged as "Strategic Habitat Conservation" or SHC, an adaptive resource management framework composed of five key elements: biological planning, conservation design, conservation delivery, decision-based monitoring, and assumption-driven research (Figure

2). The two most fundamental features of SHC are establishing specific, measurable objectives; and using models relating populations to limiting factors to target management and assess its impacts. SHC is an iterative process of developing and refining a conservation strategy, making efficient management decisions, and using research and monitoring to assess accomplishments and inform future iterations of the conservation strategy (USFWS 2008).

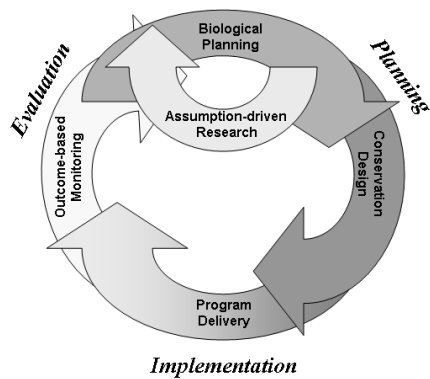


Figure 2. Strategic Habitat Conservation model.

A strategic, adaptive approach to conservation planning and implementation will be crucial to the Program for achieving conservation success at the landscape scale. With this update of its strategic plan, the Program formally endorses and adopts the SHC approach.

Ultimately, this plan is intended to:

- Describe the specific types of habitat conservation actions to be implemented.
- The location of those actions.
- The scale of those actions.
- The expected outcome of those actions for species' populations.

Program goals and strategies described here are intended to reaffirm the exceptional wildlife values associated with wetlands and riparian areas, and focus on wildlife management within these habitats for both conservation and recreational purposes. Simultaneously, these goals and strategies are intended to revitalize the Program's direction in light of new information and needs.

Within this plan, statewide goals are present first, followed by statewide strategies and tasks to support these broad goals. Due to the lack of geospatial data and wetland assessments, it is not yet possible to characterize Colorado's wetland and riparian habitat resources at a statewide scale. This will be done systematically for smaller, basin-scale planning units (see next section) as information becomes available. Specific conservation objectives, e.g. wildlife abundance targets and specific habitat conservation goals and strategies, will be developed at this scale. It is expected that stand-alone implementation plans will evolve for individual basins as additional planning tasks are completed and specific conservation objectives are developed.

Spatial Planning Units

With this iteration of its strategic plan, the Program adopts 10 major river basins in Colorado as planning units for wetland and riparian habitat conservation (Figure 3). The major river basins are modified from the USGS 6-digit hydrologic unit code (HUC6) level. HUC6 basins were modified because several small pieces of HUC6 basins occur around the edges of the state, while the majority of their area occurs in neighboring states. To divide the state into intuitive units, smaller HUC6 basins were merged with more major HUC6 basins where logical. A similar approach has been taken by most natural resource or water resource agencies within Colorado, though each divides the state in slightly different ways.

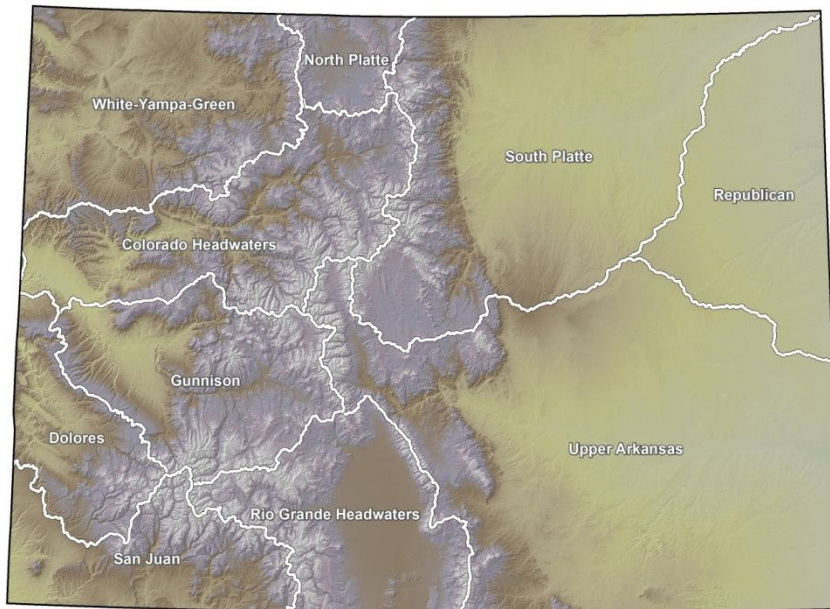


Figure 3. Major river basins representing wetland and riparian conservation planning units.

Planning units of this scale are large enough to represent landscapes, yet small enough to facilitate developing manageable wetland mapping and assessment projects for the entire basin (except for the South Platte and Upper Arkansas basins). Further, basin boundaries are largely consistent with the spatial scale at which wetland conservation partnerships have coalesced (generally at the basin scale or smaller; see Focus Area Committee boundaries in Figure 4). Finally, the State of Colorado is engaged in a multi-year planning process regarding water supply and demand in these basins. This process is facilitated by the Colorado Water Conservation Board (CWCB) through a set of Basin Roundtables (CWCB 2011). Changes in water use patterns are forecasted, and will affect wetland and riparian habitat. CPW wetland conservation objectives could be incorporated into the basin nonconsumptive water use plans; this will be facilitated by planning at the same spatial scale.

Priority Wildlife Species

Priority wildlife species for the Program are designated to focus application of available fiscal resources so that improvements in status, abundance, distribution, and hunting opportunity can be realized. Priority species are important to the overall strategic direction of the Program, and are consistent with overall Program goals (see next section). Priority wetland/riparian wildlife species include (1) waterfowl (primarily ducks) which provide valuable recreational opportunity in the form of hunting and viewing; and (2) declining or at-risk species that are dependent on wetlands or riparian areas during part or all of their life cycle.

Priority waterfowl include 8 species of ducks that collectively comprise nearly 90% of the Colorado duck harvest (Table 1). These species were selected for their importance to the overall duck harvest in Colorado, except for Northern Pintail and Lesser Scaup, which were selected due to concern for long-term population declines. Other wetland-dependent species such as cranes, rails, coots and snipe will benefit from habitat conservation and management activities targeting priority duck species.

Table 1. Wetland Program Priority Waterfowl Species and Colorado Harvest Estimates¹

Common Name	2005	2006	2007	3 yr. Ave.	% Harvest
Mallard	48,352	55,111	52,021	51,828	48.5
American Green-winged Teal	10,006	11,619	14,317	11,981	11.2
Blue-winged / Cinnamon Teal	9,548	8,311	14,850	10,903	10.2
Gadwall	11,534	9,844	9,248	10,209	9.6
American Wigeon	8,326	7,988	5,869	7,394	6.9
Northern Pintail	993	888	1,956	1,279	1.2
Lesser Scaup	458	565	356	459	0.4

¹U.S.Fish and Wildlife Service migratory bird hunting activity and harvest reports for the 2004 -2005 & 2006-2007 hunting seasons.

Priority at-risk species were selected initially from Tier 1 species in the Colorado Wildlife Action Plan (CDOW 2006) that are associated with wetland/riparian areas. After consultation with species experts from CPW and partner agencies and organizations, some species were removed from the initial list if (1) they were not strongly associated with wetland/riparian areas, (2) not enough was known about their habitat requirements to develop appropriate habitat conservation actions, or (3) substantial CPW fiscal resources were available outside the Program for habitat work for the species. The final list of priority at-risk species is shown in Table 2. This list contains 25 species; 3 mammals, 12 birds, 2 reptiles, 3 amphibians, and 5 fishes.

Table 2. Wetland Program Priority Wildlife Species of Greatest Conservation Need¹

Taxon	Common Name	Priority ²	PopStatus ³	ListStatus ⁴
Amphibians	Boreal Toad (S. Rocky Mtn. Population)	Tier 1	Low	SE
Amphibians	Northern Leopard Frog	Tier 1	Low	SC
Amphibians	Plains Leopard Frog	Tier 1	Medium	SC
Birds	Least Tern	Tier 1	Low	FE, SE
Birds	Southwestern Willow Flycatcher	Tier 1	Low	FE, SE
Birds	Piping Plover	Tier 1	Low	FT, ST
Birds	Bald Eagle	Tier 1	Low	ST
Birds	Western Snowy Plover	Tier 1	Low	SC
Birds	Western Yellow-billed Cuckoo	Tier 1	Low	SC
Birds	Long-billed Curlew	Tier 1	Low	SC
Birds	Greater Sandhill Crane	Tier 1	Medium	SC
Birds	American Bittern	Tier 1	Unknown	
Birds	Short-eared Owl	Tier 1	Low	
Birds	Red-naped Sapsucker	Tier 1	Medium	
Birds	Lewis's Woodpecker	Tier 1	Medium	
Fish	Northern Redbelly Dace	Tier 1	Low	SE
Fish	Southern Redbelly Dace	Tier 1	Low	SE
Fish	Brassy Minnow	Tier 1	Low	ST
Fish	Arkansas Darter	Tier 1	Medium	ST
Fish	Plains Orangethroat Darter	Tier 1	Low	SC
Mammals	Meadow Jumping Mouse (both subsp.)	Tier 1	Low	FT, ST
Mammals	River Otter	Tier 1	Low	ST
Mammals	Dwarf Shrew	Tier 1	Unknown	
Reptiles	Yellow Mud Turtle	Tier 1	Low	SC
Reptiles	Common Garter Snake	Tier 1	Medium	SC

¹Species identified here represent a priority subset from the Action Plan based on habitat associations.

²Priority based on Colorado's Wildlife Action Plan; refer to the Action Plan for a more complete listing of species associated with wetlands/riparian areas and the associated threats and conservation actions.

³Population status based on perceived or estimated abundance.

⁴Listing Status: SC=State Species of Concern, ST= State Threatened, SE= State Endangered, FT= Federally Threatened, FE= Federally Endangered.

Statewide Goals

Goal 1. Improve the distribution and abundance of ducks, and opportunities for public waterfowl hunting.

- a. Maintain or increase the quantity and quality of spring migration and duck breeding habitat, and duck breeding populations and production in breeding areas important to Colorado.
 - Geographic areas of emphasis (Figure 4): *Breeding areas* – North Park, San Luis Valley, Yampa/White River. *Spring migration areas* – eastern plains, western valleys, San Luis Valley.
 - Species of emphasis: Primarily dabbling ducks (genus *Anas*) including mallard, northern pintail, green-winged teal, blue-winged teal, cinnamon teal, gadwall, American wigeon (primarily North Park), and northern shoveler. Local concentrations of some diving ducks are of interest, including lesser scaup

(North Park) and redhead (San Luis Valley). See Table 1 for a list of Wetlands Program priority waterfowl species.

- Habitat types of interest: *Breeding areas* – marsh/grassland complexes with temporary, seasonal, and semi-permanent hydrologies; riparian corridors with emphasis on floodplain wetlands and complexes of beaver ponds; areas with low human disturbance. *Spring migration areas* – seasonal marshes and riparian zones with dynamic hydroperiods that support seed-producing annual plants and “pulses” of invertebrate production; habitats must be flooded during the migration period (managed flooding systems are often necessary); low human disturbance.
- b. Improve the quantity and quality of fall migration and wintering habitat to attract and support increased duck numbers, particularly on public areas.
 - Geographic areas of emphasis (Figure 4): Eastern plains (lower South Platte River corridor, lower Arkansas River corridor, Republican River corridor, eastern plains playas, Front Range reservoirs and streams), western valleys (Colorado, Gunnison, Uncompahgre, and Yampa River corridors), and San Luis Valley.
 - Species of emphasis: Primarily dabbling ducks (genus *Anas*), but divers (*Aythya*) and wood ducks (*Aix sponsa*) may also be of local interest. See Table 1 for a list of Wetlands Program priority waterfowl species.
 - Habitat types of interest: Seasonal marshes and riparian zones with dynamic hydroperiods that support seed-producing annual plants and “pulses” of invertebrate production; habitats must be flooded during the migration period (managed flooding systems are often necessary); low human disturbance. Also includes sloughs and reservoirs that provide open water for roosting during winter.
- c. Improve public access to waterfowl hunting in Colorado by increasing the number (acres) and diversity (e.g., unrestricted access public areas, reservation only public access, temporal and/or spatial restrictions on public access, leased access to private areas) of public hunting opportunities.
 - Geographic areas of emphasis: Statewide.
 - Species of emphasis: All ducks.
 - Habitat types of interest: Appropriate habitats for duck hunting (early, mid, and late season) in each area of the state.

Goal 2. Improve the status of declining or at-risk species associated with wetlands and riparian areas.

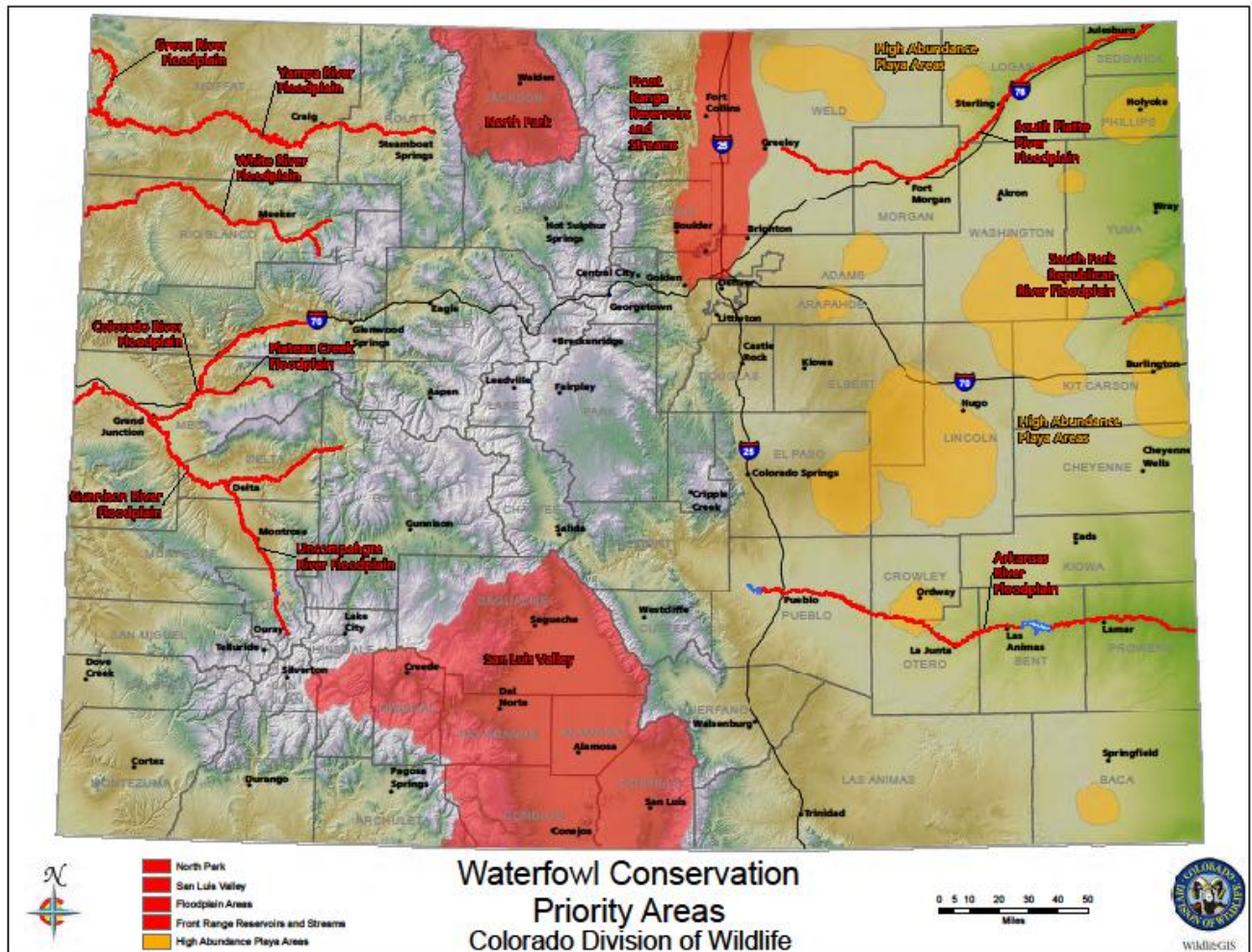


Figure 4. Preliminary priority areas for waterfowl habitat conservation.

Statewide Strategies and Tasks

Biological Planning (BP) – This purpose of this element is to describe the spatial scale for planning, define priority wildlife species toward which habitat conservation actions will be directed, develop measureable population objectives for those species, consider what may be limiting populations to less than objective levels, and develop models to describe how populations are expected to respond to habitat management.

Strategy BP1 - Define spatial planning units.

Status: Complete; see Spatial Planning Units section above.

Strategy BP2 - Select priority and focal species.

Status: Initial list of priority species has been established; see Priority Species section above.

Tasks:

1. Re-evaluate the list of priority species for the Program. The initial priority species list was developed in 2008 and should be updated. Some species currently on the list may not be habitat-limited (e.g., boreal toad), and other important species may have been omitted. This should be done in coordination with CPW's four new habitat coordinators, ensuring that all priority species for the agency will be assigned to a habitat coordinator, and in coordination with the ongoing Terrestrial Section initiative to prioritize nongame species for future conservation actions.
2. Select focal species that will be used to represent the needs of larger guilds of species that use habitats and respond to management similarly. The current list of priority species is large; this step will reduce the number of species to a manageable level for subsequent planning.
3. Develop a focal species list for each river basin planning unit, based on species occurrence in the unit and additional factors as needed.

Strategy BP3 - Set population objectives.

Status: To be completed.

Tasks:

1. Consult all existing conservation plans for population objectives that could be used as-is or adapted for habitat conservation planning. Example plans include the Colorado Statewide Waterfowl Management Plan (CDOW 1989), Colorado state plans for the migratory bird initiatives (e.g., Partners in Flight) and the bird habitat conservation Joint Ventures, etc. For migratory birds, population objectives should be stepped-down to the Program planning units from larger scale plans, such as the continental plans for waterfowl, shorebirds, waterbirds, and landbirds. In some cases the Joint Ventures have developed these objectives. Ideally, population objectives will contain both desired abundance and a performance indicator (e.g., number of annual recruits).
2. Consult species experts to develop new population objectives where needed.

Strategy BP4 - Identify limiting factors and appropriate management treatments.

Status: In progress for the North Platte and South Platte basins as part of ongoing projects through the CNHP/EPA partnership. In the North Platte basin, specific wetland habitat types used by ducks have been described, along with management actions believed to increase habitat carrying capacity. In late 2011, this work will be repeated for focal species (TBD) in the South Platte basin. Results will be included in future updates of this plan after these projects are completed.

Tasks:

1. In partnership with CNHP and EPA, continue researching habitat requirements and beneficial habitat management practices for priority species (see Lemly 2010; p. 14). Basins where previous or ongoing wetland mapping and assessments have been conducted should be first priority (i.e., Rio Grande Headwaters, North Platte, and South Platte).

Strategy BP5 - Develop and apply models to help understand the relationship of species populations to limiting factors (i.e., habitat quantity and quality).

Status: To be completed.

Tasks:

1. Conduct a literature research for existing, useful models. Some models have already been developed by partners such as the Joint Ventures.

2. Develop new models as needed. Basins where previous or ongoing wetland mapping and assessments have been conducted should be first priority (i.e., Rio Grande Headwaters, North Platte, and South Platte).

Conservation Design – The purpose of this element is to determine the quantity and location of habitat conservation actions to be implemented.

Strategy CD1 - Characterize and assess the landscape.

Status: In progress. It is currently not possible to estimate the quantity and quality of wetland and riparian areas throughout the state. All known digital data on Colorado wetlands and riparian areas have been compiled through the CPW/CNHP/EPA partnership (Lemly et al. 2011). However, large gaps in digital data remain; complete digital data is currently available for just two basins (Rio Grande Headwaters and North Platte). Further, much of the wetland mapping data is outdated (late 1970s and early 1980s). General assessments of wetland condition have been conducted by CNHP in the Rio Grande Headwaters and North Platte basins, but field measurement protocols were not designed specifically to measure wildlife habitat value. These metrics were partially developed for the North Platte basin and will be developed for the South Platte basin in late 2011.

Tasks:

1. Finish digitizing existing wetland mapping data statewide (see Lemly 2010; p. 6).
2. Create new wetland maps in high priority areas (see Lemly 2010; p. 7).
3. Develop metrics to quantify wildlife habitat value of wetlands and incorporate in all future field assessments (see Lemly 2010; p. 14).
4. Using models developed in Biological Planning, estimate the current landscape carrying capacity for focal species in all basins.

Strategy CD2 - Assess the conservation estate.

Status: In progress. The amount and type of wetlands has been characterized by ownership (including individual management units such as State Wildlife Areas) in the Rio Grande Headwaters basin (Lemly et al. 2011), and is in progress for the North Platte basin.

Tasks:

1. Where digital data are available, summarize acres of wetland and riparian habitat protected, restored, enhanced, created, and managed in each basin by ownership.
2. Using models developed in Task BP5, estimate contributions by ownership to focal species abundance. Begin in basins where wetland mapping and assessments have been conducted (Rio Grande Headwaters, North Platte, and South Platte).

Strategy CD3 - Develop species-specific, spatially-explicit models as decision support tools.

Status: To be completed.

Tasks:

1. Using spatial habitat data and species/habitat models, develop maps of predicted density of each focal species in each basin (i.e., “thunderstorm” maps). Begin in the Rio Grande Headwaters, North Platte, and South Platte basins.

Strategy CD4 - Designate priority areas.

Status: Priority areas for waterfowl conservation have been identified by CPW experts (Figure 4). However, these were opinion-based and not the result of formal landscape assessments.

Tasks:

1. Formally designate and map priority areas encompassing high density areas for focal species as identified from the landscape assessment in Strategy CD3.

Strategy CD5 - Formulate habitat objectives.

Status: To be completed.

Tasks:

1. Using population objectives (Strategy BP3) and species/habitat models (Strategy BP5), estimate population deficits and translate into acres of specific habitat types needing management to eliminate the deficit.

Habitat Delivery – This element serves to implement habitat conservation treatments through various organizations and programs. Many wetland and riparian habitat delivery efforts are currently underway, but without coordination or mutual goals to achieve desired population status of selected wildlife species.

Strategy HD1 - Develop program objectives.

Status: To be completed.

Tasks:

1. Translate habitat objectives developed in Strategy CD5 into explicit, ownership- and program-specific objectives (e.g. State Wildlife Areas, private lands, USFWS Partners Program, USDA Wetlands Reserve Program, etc.).
2. Ensure consistency in project ranking criteria among programs.

Monitoring – This element serves to assess program and agency accomplishments, impacts on wildlife populations, and to assess net progress (incorporating habitat gains and losses) toward population objectives.

Strategy M1 - Develop conservation project tracking system.

Status: To be completed. CPW's current system for project tracking (various electronic and paper files) is inefficient. A tracking database was developed by the Rocky Mountain Bird Observatory (RMBO) during 2002-2006 as part of the Wetlands Monitoring and Evaluation Project (WMEP; also see Strategy M2). This database was reviewed recently and does not contain complete information needed for long-term tracking purposes (e.g., funding amounts by partner).

Tasks:

1. Develop a project tracking database (likely MS-Access) to house all information on wetland and riparian habitat conservation projects funded through the Program.
2. Enter new project information as projects are funded, and update with information from final project completion reports.
3. Enter historical project information.
4. Develop protocols for consistent annual and long-term accomplishment reporting. Report annual accomplishments in typical acreage and dollar measures, but also in species response using models developed in Strategy BP5.

Strategy M2 – Develop conservation project monitoring program.

Status: To be completed. Currently no periodic follow-up is required for habitat projects funded through the Program. The long-term persistence of habitat treatment benefits from these projects is unknown; this can be affected by the degree of project maintenance. Periodic project assessments could inform future project design and maintenance recommendations. Pre- and post-project monitoring for wildlife use could inform species/habitat models and the adaptive management process. RMBO's WMEP, funded by CPW and other partners, included a team that visited project sites pre- and post-delivery (see Strategy M1). This initiative suffered from inconsistent funding, but should be reinstated.

Tasks:

1. Develop protocols and plans for long-term habitat project monitoring. Objectives should be to determine if habitat management actions resulted in the expected habitat response, and if habitat changes evoked expected species response.

Strategy M3 - Assess net change in habitat (and species population status).

Status: To be completed.

Tasks:

1. Develop protocols and plans for long-term monitoring of wetland and riparian habitat quantity and quality. The initial foundation for this effort has been developed by the CPW/CNHP/EPA partnership through initial wetland mapping and assessments in selected basins (see Strategy CD1). This is a mutual goal of the CNHP wetland program (see Lemly 2010, p.7).
2. Apply species/habitat models developed in Strategy BP5 to revised habitat data to determine net progress towards wildlife population objectives.

Research – This element serves to test assumptions involved in the Biological Planning and Conservation Design elements, furthering the adaptive management cycle (Fig. 2), and to help CPW develop its research priorities.

Strategy R1 - Define species/habitat model assumptions.

Status: To be completed.

Tasks:

1. After models are developed (see Strategy BP5), list the assumptions made (e.g., focal species limiting factors, predicted densities/habitat quality, etc.). Prioritize the assumptions based on the degree of uncertainty, and the extent to which better information would affect future management decisions.
2. Work with CPW researchers and partners to design and implement research studies to test these assumptions.

Strategy R2 - Define habitat treatment assumptions.

Status: To be completed.

Tasks:

1. Develop a list of the habitat treatments for which the impacts on focal species abundance and/or vital rates is not well known. Prioritize the assumptions based on the degree of uncertainty, and the extent to which better information would affect future management decisions.
2. Work with CPW researchers and partners to design and implement research studies to test these assumptions.

Strategy R3 - Assess spatial data.

Status: To be completed.

Tasks:

1. Develop a list of concerns relating to the limitations of current spatial databases as they may affect conservation planning. Prioritize the list based on the degree of uncertainty, and the extent to which better information would affect future management decisions.
2. Work with CPW GIS staff and partners to improve spatial data for landscape monitoring.

Partnerships – This element recognizes the critical importance of partnerships to the success of the Program. Local Focus Area Committees (FACs; see Figure 5 and Table 3) have been an integral component of the Program since its inception. FACs were adapted from the successful focus area concept of the North American Waterfowl Management Plan. Focus areas and their implementation bodies, both nationally and in Colorado, were initially designated to target resources toward wetland conservation in important waterfowl areas, but have evolved into broader habitat conservation initiatives benefitting other wildlife. FAC membership and meetings generally are open. Membership often is diverse, including agency and NGO biologists, scientists, educators, landowners, and recreationists. FACs function independently and activity levels, meeting frequencies, and participation by various partners differs among FACs. FACs have been especially valuable to the Program in develop wetland conservation projects for funding consideration, and in leveraging Program funds to secure other available funding for wetlands conservation, often by several fold. Roles of the FACs include:

- Identify and generate, evaluate and prioritize funding proposals for wetlands projects at the local/regional level.
- Serve as a source for local wetlands knowledge, including quantity, quality, threats, opportunities for conservation, wildlife use, recreational significance, etc.
- Assist in site visits for grant proposals.
- Conduct education and outreach with the local community on wetlands conservation opportunities.
- Provide a forum for wetlands conservation discussions, including how national, regional, and statewide initiatives can be implemented locally on the ground, and establishing local buy-in for projects, especially those that are potentially controversial.
- Participate in forming and nurturing wetlands conservation partnerships.
- Assist the local community in the success of wetlands conservation projects.
- Develop and maintain a strategic plan.

Strategy P1 – Support existing wetland and riparian conservation partnerships and foster new partnerships as needed.

Status: Ongoing. Six of the originally identified FACs remain active; these are supported by CPW Program and field staff participation, information exchange, and project funding assistance. New partnerships have developed based on grassroots interest (e.g., Northwest Colorado Partnership, Dolores River Partnership, Three Rivers Alliance, etc.).

Tasks:

1. Share new information on project funding opportunities when available, and continue to involve the FACs in evaluating CPW project funding applications.

2. Involve existing partnerships in Program planning and development. Involve the South Platte FAC in planning for upcoming wetland mapping and assessment work in that basin, and the San Luis Valley and North Park FACs in reviewing products and plans from previous or ongoing wetland assessments.
3. When specific, measureable habitat objectives are developed for specific geographic areas, ensure partnerships are in place to implement projects at a sufficient scale. Consider direct financial support of FACs at this time (for coordination activities, etc.)

Strategy P2 –Incorporate Program habitat objectives into Colorado’s water supply planning.

Status: To be completed. Water supply planning is in progress through CWCB’s basin roundtables, including for nonconsumptive water use. This planning may influence water availability for wetland and riparian restoration and management. Specific nonconsumptive water use objectives can be challenging to develop, so Program planning may inform the CWCB effort. Integrating wildlife habitat objectives into CWCB basin planning may lead to new habitat conservation partnerships.

Tasks:

1. When specific, measureable habitat objectives are developed for individual basins, request inclusion in basin water use plans.

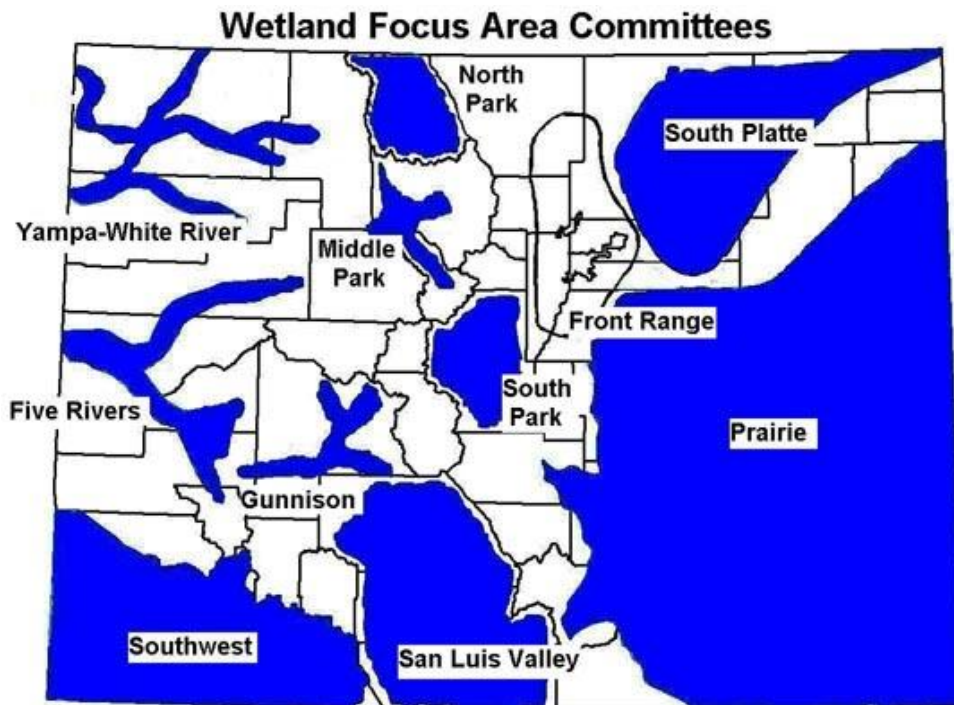


Figure 5. Wetland Focus Area Committee boundaries.

Table 3. Wetland Focus Area Committee contacts.

Focus Area Committee	Contact	Phone	Email
North Park	Barbara Vasquez	970-723-3270	bv_99_munich@yahoo.com
South Park	Dieter Erdmann	303-988-2373 ext. 217	derdmann@coloradoopenlands.org
San Luis Valley	(1) Peter Clark	719-852-5114 ext. 320	peter.clark2@co.usda.gov
	(2) Rio de la Vista	719-850-2255	riovista@rmi.net
South Platte	Noe Marymor	970-330-0380, ext. 207	noe.marymor@co.usda.gov
Gunnison	Inactive		
Prairie and Wetlands	Seth Gallagher	970-482-1707	seth.gallagher@rmbo.org
Southwest	Catherine Ortega	970-247-7393	ortega_c@fortlewis.edu
Yampa/White River	Inactive		
Five Rivers	Inactive		
Front Range	Inactive		
Middle Park	Inactive		

Funding – This element is to ensure there are sufficient financial resources available to support all Program elements. CPW funding availability for the Program has varied annually; recent support (2008 – 2011) has been \$1.2 – \$1.4 million. Funding sources include GOCO, game cash (hunting and angling license fees), and Colorado waterfowl stamp funds. Use of these funds historically has been restricted to on-the-ground habitat improvement projects. Additional funding for habitat protection projects is available through CPW’s Habitat Protection Program. The nonfederal source of all CPW funds is valuable to partners in securing matching funds from federal sources (EPA, NAWCA, Farm Bill, etc.).

Strategy F1 –Continue the recent level of Program funding.

Status: Ongoing. However, the program funding level for fiscal year 2011-12 and beyond is uncertain due to agency restructuring and financial issues.

Tasks:

1. Continue annual budget requests commensurate with recent funding levels. Adjust future budget requests commensurate with costs of specific habitat goals identified through planning.
2. Ensure wetland and riparian conservation remains a priority in CPW’s Habitat Protection Program.
3. Communicate annual program accomplishments to decision makers to support budget requests.

Strategy F2 – Diversify Program funding to allow direct support of planning, monitoring and evaluation projects.

Status: To be completed. Historical policies and statutes have required Program funding to be used solely for on-the-ground habitat conservation projects. Program funding has not been available to date for other critical program development and evaluation tasks. A

Federal Aid (Pittman-Robertson) project currently is being drafted for consideration by the USFWS to support this work.

Tasks:

1. Consult with CPW and GOCO leadership on developing new, more flexible policies for existing Program funding.
2. Seek new funding for this work, especially Federal Aid.

Strategy F3 – Increase net revenue from the Colorado waterfowl stamp program.

Status: In progress. Net revenue from the waterfowl stamp program has declined to less than \$100,000 annually due to declining stamp sales and increasing sales transaction fees. A work plan was developed containing several recommendations to increase profitability of this program (CDOW 2009). Some of these recommendations have been implemented.

Tasks:

1. Negotiate contract with license vendor to reduce transaction fees.
2. Build support for and implement a stamp fee increase, to \$10 from the current \$5. A statutory amendment will be required.
3. Continue promoting the stamp artwork to collectors through CPW media outlets, and developing efficiencies for the artwork program.

Strategy F4 – Help partners secure non-CPW funds to support all Program elements.

Status: Ongoing. Partners are adept at securing matching funds for cooperative projects, often leveraging CPW funds at ratios of 3:1 or greater.

Tasks:

1. Continue to support partner requests for CPW in-kind matching funds for high quality projects meeting Program goals.

Granting – This element is to ensure fair and equitable distribution of fiscal resources to CPW staff and partners for projects that contribute to Program goals.

Strategy G1 – Provide funding on a competitive basis through a wetlands funding Request for Applications (RFA).

Status: Ongoing. RFAs have been issued annually. The fiscal year 2011-12 RFA is on hold pending funding availability.

Tasks:

1. When funding becomes available, update the RFA to direct funds toward highest priority conservation actions and locations identified in this plan (see Appendices).

Education and Outreach – This element is to inform conservation practitioners about Colorado's wetland and riparian resources, threats to those resources, and conservation opportunities and techniques.

Strategy E01 – Develop tools to increase CPW staff and partner knowledge of wetland and riparian habitats and their conservation.

Status: In progress. Several tools are currently in development, or planned for the near future, through the CPW/CNHP/EPA partnership (see Tasks below).

Tasks:

1. Refine the online wetland mapping tool developed in spring 2011 (see <http://www.cnhp.colostate.edu/download/projects/wetlands/index.asp>) by sharing the beta version with selected staff and partners (e.g., Focus Area Committees) and seeking feedback to improve its utility (see Lemly 2010; p. 7).
2. Create a Colorado Wetland Website to consolidate all types of information on wetlands within the state (see Lemly 2010; p. 4).
3. Create a Colorado-specific field guide to wetlands plants (see Lemly 2010; pp. 4-5).

Strategy EO2 – Conduct professional training workshops on wetland and riparian habitat conservation.

Status: Ongoing. The Program has sponsored wetland conservation workshops in the past (e.g., 2008 Southeast Colorado Wetland Workshop in Pueblo).

Tasks:

1. Conduct wetland plant identification trainings (see Lemly 2010; p. 5).
2. Conduct workshops to inform CPW staff and partners of wetland conservation needs, opportunities, techniques, and resources.

Plan Contacts

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The Wetlands Program Coordinator will remain the point of contact for Program activities, reporting to the Terrestrial Habitat Conservation Program Supervisor. This position is valuable in focusing strategies for wetlands conservation, as well as being a point of contact for integrating these strategies into other habitat conservation programs conducted by CPW. Wetland-dependent wildlife populations by definition are most likely to benefit from conservation activities that focus on wetland habitats. A programmatic focus on priority wetland wildlife species will also improve CPW's ability to monitor and evaluate the effectiveness of these conservation efforts.

The Wetlands Program Coordinator will be the point of contact with Focus Area Committees, funding partners in the non-profit community, JVs, USFWS' Partners for Wildlife program, EPA, CDOT wetlands efforts, and other local, state and federal level wetlands programs operating in Colorado. This position will have a lead role in planning and in developing monitoring/assessment programs that will direct future expenditures for wetland and riparian conservation projects.

The Wetlands Program Coordinator will be responsible for announcing the availability of Wetlands Program funds to potential applicants, and describing the criteria by which funds will be awarded – consistent with the goals and strategies in this plan.

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Appendix A – Rio Grande Headwaters Basin

Basin Description

The environmental and social setting of the basin, including physiography, geology, climate, land use, water resources, soils, vegetation, land ownership, human history, and socio-economic conditions has been adequately described in numerous publications and will not be repeated here. See USFWS (1955), Hopper (1968), Olterman (1995), Sarr and Sanderson (1998), Rondeau (1999), Rocchio et al. (2000), SLVWFAC (2000), Freeman et al. (2006), Rocchio (2004), Neid and Jones (2008), Lemly et al. (2011) and references therein.

Historical Wetland Assessments in the Basin

The USFWS estimated approximately 141,000 acres of wetlands in the San Luis Valley in 1955 (USFWS 1955).

Hopper (1968) estimated approximately 230,000 acres of wetlands in the irrigated portion of the San Luis Valley. This acreage is thought to have declined significantly, primarily due to changes in irrigation practices (CDOW 1989).

CNHP's County Wetland Inventories and Assessments

With funding from EPA, CDOW, and other partners, CNHP has completed wetland surveys in most counties within the basin, including Alamosa (Rocchio 2004), Archuleta (Freeman et al. 2006), Conejos (Rocchio et al. 2000), Costilla (Rocchio 2004), Hinsdale (Neid and Jones 2008), Mineral (Rondeau 1999), Rio Grande (Rocchio et al. 2000), and Saguache (Sarr and Sanderson 1998) counties. The purpose of these surveys was to systematically identify the localities of rare, threatened, or endangered species dependent on wetland and riparian areas and the location of significant natural wetland and riparian plant communities. Identification of sites containing natural heritage resources enables conservation of these resources for future generations, and proactive planning to avoid land use conflicts in the future.

These surveys delineated Potential Conservation Areas (PCAs) to identify land areas that can provide the habitat and ecological processes upon which a particular species, or suite of species, depends for continued existence. The PCAs are ranked for their biodiversity significance.

CNHP's Recent Mapping, Profiles, and Condition Analyses

CNHP recently completed a major project to map, profile, and assess the condition of wetlands in the basin (Lemly et al. 2011). Key findings include:

Wetland Quantity, Types, Locations, etc.

- There are 282,804 acres of wetlands and water bodies within the basin, representing just under 6% of the total land area.

- The vast majority (nearly 90%) of wetlands are Palustrine Emergent (freshwater herbaceous wetlands).
- Temporary or seasonally-flooded wetlands are the most common hydrologic regime (70% collectively).
- Approximately one-third of wetlands are irrigated, and these are overwhelmingly (99%) freshwater herbaceous wetlands.
- The density of wetlands is greatest on the valley floor.
- Freshwater marshes and saline wetlands occur more frequently on the valley floor.
- 659 individual plant taxa were recorded in sampled wetlands, of which 85% were native species.
- The most common plant species encountered across all sampled sites was *Juncus arcticus* ssp. *ater* (mountain rush, also commonly referred to as Baltic rush), at 60% of sites.

Ownership

- Private landowners host a majority of the basin's wetlands (66%), and approximately 40% of the acres are irrigated.
- The USFS and USFWS host the majority of wetlands in public ownership (15% and 10%, respectively).
- The State Land Board hosts 3% of the wetlands, and the CPW, BLM, NPS, USBOR each host approximately 1%.
- There are approximately 32,000 acres of wetlands on properties owned by the USFWS, BLM, and CPW.

Stressors

- More than half of all wetland acres fall in the severe stress category.
- The most severely stressed wetlands are forested wetlands, rivers, and herbaceous wetlands.
- Wetlands hosted by the USFS are the least stressed, whereas wetlands hosted by other public agencies are highly stressed.
- Wetland condition was highest for fens and riparian areas, and lowest for saline wetlands and marshes.
- Wetlands at the lowest elevations had the lowest condition scores.

San Luis Valley Wetlands Focus Area Committee Plans and Goals:

The San Luis Valley Wetlands Focus Area Committee (SLVWFAC) developed a community wetlands strategy (SLVWFAC 2000) and an action plan for 2003-2004 (SLVWFAC 2003). Although these plans did not contain specific wetland conservation goals, the broad goal of the Committee is *"To sustain wetland areas that are of quality and quantity sufficient to maintain healthy and viable natural communities and wetland-dependent species; and to support the planning and implementation efforts of wetland community managers by pursuing applicable resources, including those available through the CDOW Wetlands Funding Process"*.

Wildlife Population Objectives from Other Plans (for Program priority species)

The San Luis Valley waterbird plan (Olterman 1995) recommends a breeding population of 55,000 ducks on surveyed production areas, including 25,000 on managed areas, and a spring migrant

population of 18,000 – 22,000 greater sandhill cranes (consistent with an older version of the PFC and CFC management plan).

The Pacific Flyway Council (PFC) Central Flyway Council (CFC) management plan for the Rocky Mountain population of Greater Sandhill Cranes (PFC and CFC 1997) specifies a population objective of 17,000 – 21,000 birds. Virtually the entire population stages in the basin during spring and fall migrations (March and October).

Stone et al. (2009) developed passage shorebird objectives (stepped-down from continental objectives) for the BLM Blanca Wildlife Habitat Area for bi-weekly periods during the spring and fall migration, totaling approximately 709,000 use-days.

Wetland Habitat Conservation Objectives from Other Plans

The overall goal of the San Luis Valley waterbird plan (Olterman 1995) is *“To provide and protect a habitat base of sufficient quality and quantity to maintain healthy and viable populations of waterbirds in the San Luis Valley”*. Specifically, the plan recommends maintaining 230,000 acres of wetlands with widespread distribution, of which 30,000 acres are to be intensively managed on public lands (25% or 7,500 acres for nongame waterbirds). The plan also recommends emphasis below 8,000 feet elevation, the most important region for waterbirds. The plan identified 22,209 acres of managed, publicly-owned wetlands, including 15,900 acres by the USFWS, 3,659 acres by CPW, and 2,650 by the BLM.

Stone et al. (2009) calculated that existing habitat on the BLM Blanca Wildlife Habitat Area is insufficient to support shorebird population objectives for the majority of the migration window. The maximum habitat deficit was 517 acres during early August.

Interim Objectives

This plan recommends a new approach for developing wetland habitat conservation objectives that are linked to wildlife population objectives with the best possible science. Until those objectives can be developed, the following interim objectives are adopted:

Population

1. 55,000 breeding ducks
2. 21,000 Greater Sandhill Cranes during spring and fall migration
3. 709,000 shorebird use-days during spring and fall migration at the BLM Blanca Wildlife Habitat Area

Habitat

1. Maintain 282,804 acres of wetlands and water bodies (i.e., no net loss of wetlands), including 230,000 acres on the valley floor
2. Manage 30,000 acres of wetlands on public lands on the valley floor
3. Maintain or increase wetland condition scores (as measured by CNHP in 2008-09)

Strategies

- Focus wetland conservation efforts on the valley floor, where the density of wetlands is highest and the types of wetlands important to wildlife are most prevalent.
- Emphasize wetland conservation programs for private lands. Continue to support the USFWS Partners for Fish and Wildlife Program, and develop a partnership with USDA on Farm Bill conservation programs.
- Restore, enhance, and create wetlands on public lands, and maximize management capability on existing wetlands (periodic water management infrastructure upgrades are needed). Continue to support wetland and riparian restoration and enhancement projects on intensively managed lands owned by CPW, USFWS, BLM, etc.
- Implement wetland conservation projects on CNHPs PCAs where a wetlands program priority species has been identified, especially those PCAs with high biodiversity significance ranks.

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