Colorado Natural Heritage Program

Wetland Program Plan

A Vision for Building Comprehensive Wetland Information for the State of Colorado

Planning Years 2011–2015




Colorado Natural Heritage Program
Providing Comprehensive and Reliable Biological Information For Colorado

Colorado State University

Colorado Natural Heritage Program Wetland Program Plan

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CNHP Wetland Program Plan Mission Statement

To empower public and private partners by providing science-based information on the types, extent, location, condition, and biodiversity significance of Colorado's native wetland ecosystems.

History and Background

The Colorado Natural Heritage Program (CNHP) is a non-profit organization and a research unit within the Warner College of Natural Resources at Colorado State University. General information about CNHP and the breadth of work conducted by the organization can be found at our webpage: http://www.cnhp.colostate.edu/. CNHP is also a member of the NatureServe Network, an international network of natural heritage programs that use the same scientific methodology to monitor the status of species and natural communities from state, national, and global perspectives. For more information on the NatureServe Network, visit http://www.natureserve.org/.

The overarching mission of CNHP is *to preserve the natural diversity of life by contributing the essential scientific foundation that leads to lasting conservation of Colorado's biological wealth.* As part of the overall mission and among many other areas of expertise, CNHP has established a long track record of field surveys to identify wetlands worthy of conservation action throughout the state. Since 1993, CNHP has conducted surveys of biologically significant resources in 36 counties, documenting hundreds of high quality wetlands and locations of rare wetland plants and animals. In addition, CNHP has been the leading organization for information and research on wetland plant communities. In 2003, after more than ten years of field-based research, CNHP published the *Field Guide to Wetland and Riparian Plant Associations of Colorado* (Carsey *et al.* 2003), providing a vital resource for wetland professionals across the state. These efforts have been funded by a variety of partners, including the Environmental Protection Agency (EPA), Great Outdoors Colorado (GOCO), Colorado Division of Wildlife (CDOW), U.S. Forest Service (USFS), Bureau of Land Management (BLM), and numerous county and local governments. The surveys have also involved coordination with hundreds of private landowners, citizen groups, and conservation organizations.

In 2007, CNHP and the CDOW Wetland Wildlife Conservation Program were awarded an EPA Region 8 Wetland Program Development Grant (WPDG) titled *Statewide Strategies for Colorado Wetlands* (Assistance ID #CD-97874301). One core objective of this project was to formulate strategies for improving the effectiveness of protecting and restoring Colorado's wetland resource. In the original project proposal, the emphasis on strategic planning was specifically focused on refining the strategic plan of CDOW's Wetland Program. However, through the course of carrying out the project, it became clear that CNHP should refine its own vision for wetland research over the next five to ten years. Subsequently in 2009, EPA's National Wetlands Division released guidance that every agency and organization conducting research under WPDG funding should prepare and submit a Wetland Program Plan to guide future proposals under WPDG opportunities. These two coincidental motivations coalesced into the formation of this plan, which documents the goals and actions proposed by CNHP for the five years between 2011 and 2015.

Colorado Natural Heritage Program and the Core Elements Framework

In 2008, the EPA's National Wetlands Division developed the Core Elements Framework (CEF), which includes four core elements of a comprehensive wetlands program. The four elements are: 1) Monitoring and Assessment, 2) Regulation, 3) Voluntary Restoration and Protection, and 4) Water Quality Standards for Wetlands. Further information on the CEF can be found at: http://water.epa.gov/grants_funding/wetlands/cefintro.cfm.

In the state of Colorado, no single agency or organization oversees work on all four of the core elements, nor is there an official coalition or council that facilitates joint work on all four elements. Instead, individual state agencies or organizations focus on particular aspects.

In Colorado, regulation of wetland impacts (Core Element #2) is primarily the jurisdiction and responsibility of the U.S. Army Corps of Engineers (ACOE), under Section 404 of the Federal Clean Water Act. To oversee permit actions in the state, the ACOE works in coordination with the EPA and the state water quality agency, the Colorado Department of Public Health and the Environment (CDPHE). A few county and municipal governments have ordinances that apply to wetlands, but there is no comprehensive wetlands regulation program within the state.

Voluntary restoration of wetland and riparian habitat (Core Element #3) is an active goal of many agencies and organizations in Colorado. The primary state agency involved in this work is the Colorado Division of Wildlife (CDOW), through their Wetland Wildlife Conservation Program (http://wildlife.state.co.us/LandWater/WetlandsProgram/), a voluntary, incentive-based program whose mission is to protect wetlands and wetland-dependant wildlife on public and private land. Each year, the CDOW Wetlands Program funds ~$1.5 million in direct on-the-ground wetland restoration and enhancement actions. The Wetlands Program is also involved with wildlife and aquatic resource inventories, education and outreach, and project monitoring and evaluation. In addition to the CDOW Wetlands Program, numerous federal agencies and non-profits work to encourage restoration and conservation of valuable wetland habitat through direct funding, landowner education, tax incentives, and many other vehicles.

Water quality standards for wetlands (Core Element #4) have not yet been developed for Colorado. If they were developed, this would be done by CDPHE, the agency responsible for water quality monitoring and the development of water quality standards.

CNHP's primary role in the CEF is encompassed by monitoring and assessment (Core Element #1). Specific goals and actions under this element will be described in detail throughout this plan. Though much of our work falls under only one core element, this element can been regarded as the backbone of the framework. Data generated through monitoring and assessment feed into the other three elements and strengthens the effectiveness of each one. Understanding the types, acreage, condition, and significance of wetlands across the state can help ACOE plan for more effective mitigation action, CDOW target wetland types in need of restoration, and CDPHE report out on the condition of water within the state.

Strategic Directions

The following section details six strategic directions CNHP will undertake to accomplish the mission statement set forth in this plan: *To empower public and private partners by providing science-based information on the types, extent, location, condition, and biodiversity significance of Colorado's native wetland ecosystems.*

Since the beginning of CNHP's work on Colorado wetlands, the same core questions have been asked again and again.

- *What kinds of wetlands occur in Colorado?*
- *How many acres of wetlands exist in Colorado and where are they located?*
- *What is the condition of Colorado's wetlands?*
- *Which of Colorado's wetlands are most significant?*

The strategic directions outlined below address each of those four questions and are organized accordingly. In addition to the four questions, the final strategic direction addresses the first portion of the mission statement: *empowering our partners with information.* Because CNHP is not directly involved with wetland restoration, protection, or regulation, it is vital that the information generated by CNHP is transferred to our partners to create effective on-the-ground action. Taken together, these strategic directions will lead to more comprehensive wetland information for Colorado.

Each strategic direction below begins with a statement of intent and includes a series of action items. The action items are either part of currently funded projects and will take place during the period covered by this plan (2011–2015) or are goals for future funding. For action items already funded, the specific funding source is identified and the planned timeframe laid out. For potential future action items, a potential timeframe is suggested.

Because wetlands cannot be viewed apart from their surrounding uplands, nor can a snapshot in time be sufficient to understand important trends, CNHP will continually seek opportunities to integrate wetlands project described below with analyses and efforts at multiple spatial scales, across whole landscapes, and through time. As a multi-disciplinary research organization, we have the opportunity to connect wetlands research with ongoing research on the integrity of Colorado's upland ecosystems as well as with long-term studies that track changes in Colorado's biodiversity resulting from major landscape scale issues such as climate change, rapid development and land conversion, and the mountain pine beetle epidemic, to name only a few. As a soft-money funded organization continually adapting to changing funding priorities and opportunities, it should also be mentioned that the strategic directions outlined below may not capture every opportunity that CNHP will pursue in the coming years. New directions may emerge from our partners that fit in line with our overall mission regarding the generation of scientifically grounded information about Colorado's wetland resource. We intend to revisit this plan on an annual basis to make minor changes and to create a new Wetland Program Plan before this planning period expires.

Wetland Types: Classification and Identification

CNHP is and will continue to be a leading resource of information on wetland classification and identification for local and state governments, agency personnel, conservation partners, consultants and private citizens. The following action items will help wetland professionals determine the *types of wetlands* that occur in Colorado.

Action items

- **Publish a Field Guide to Wetland Plants of Colorado:** Through a 2009 EPA Region 8 WPDG (*Colorado Wetland Tools:* Assistance ID #CD-97847301), CNHP will develop and publish a Field Guide to Wetland Plants of Colorado. This full-color field resource will include botanical descriptions of ~500 plant species found in wetlands across the state. In addition to descriptions, the guide will include photographs and line illustrations, diagnostic characteristics, tips for distinguishing between similar species, and information pertaining to wildlife use.

  Timeframe: Content for the guide is currently under development and the book will be published by April 2012.

- **Develop Key and Descriptions for Wetland Ecological System:** The Ecological System Classification was developed by the NatureServe Network as a landscape-level classification system that integrates biotic and abiotic factors (Comer *et al.* 2003). Ecological systems are dynamic assemblages of plant communities that 1) occur together on the landscape; 2) are tied together by similar ecological processes, underlying abiotic environmental factors or gradients; and 3) form a readily identifiable unit on the ground. There are ~15 wetland and riparian Ecological Systems in Colorado, (*e.g.,* Rocky Mountain Subalpine Fen, Lower Montane Riparian Woodland and Shrubland, *etc.*) that can be distinguished by hydrologic and edaphic characteristics and diagnostic species. Descriptions for many Ecological Systems have been developed by NatureServe, but these descriptions cover the Systems' entire range, are not specific to Colorado, and there is no key to reliably distinguish between Systems.

  Through a National EPA grant (*Refining Ecological Indicators for the Rocky Mountains:* Assistance ID #RM-83379601) CNHP has worked with partner Natural Heritage Programs in Montana and Wyoming to refine descriptions and create a key for select Ecological Systems. Through a 2009 EPA Region 8 WPDG (*Colorado Wetland Tools:* Assistance ID #CD-97847301), CNHP will develop detailed descriptions and a key to all wetland and riparian Ecological Systems that occur in Colorado. The descriptions and key will allow wetland professionals to distinguish between different wetland types and will contain information on best management practices and conservation concerns specific to each type.

  Timeframe: Draft descriptions and key are available for select Systems; the fully developed descriptions and key will be completed by December 2011.

- **Create a Colorado Wetland Website:** CNHP has published numerous reports on Colorado wetlands and is currently involved in several major ongoing projects to develop additional wetland resources. Through a 2009 EPA Region 8 WPDG (*Colorado Wetland Tools:* Assistance ID #CD-97847301), CNHP will create a separate section within our website to consolidate all currently available wetland resources. Products from every action item listed in this strategic plan that involves the development of wetland information will be integrated into the Colorado Wetland Website. Along with CNHP-specific resource, the Colorado Wetland Website will include links to all organizations and agencies involved with wetlands in Colorado.

  Timeframe: Much content for the Colorado Wetland Website is already developed and additional content is being developed through current projects. The webpage design and formatting is scheduled for spring 2011 and the website will be available by December 2011.

- **Publish a Pocket Guide to Common Wetland Plants of Colorado:** To follow the upcoming Field Guide to Colorado Wetland Plants, CNHP has identified a need for a smaller, more portable guide to the most common wetland plants in Colorado. While the complete Field Guide will contain detailed information on ~500 different species, the Pocket Guide will focus on the most common 50–100 species and lump difficult species groups such as willows and sedges. The Pocket Guide will be a quick resource for wetland professionals and amateur naturalists that do not need to identify plants to species, but would like to recognize dominant species and groups. Content for the Pocket Guide will be easy to pull from the more detailed Field Guide, but additional time and resources will be needed for formatting and publishing.

  Timeframe: This action item is a proposed goal for which we will seek grant funding. The target timeframe for this action item is to secure funding in either 2011 or 2012 and to publish the Pocket Guide by December 2013.

- **Conduct Professional Trainings on Wetland Plant Identification:** Collectively, CNHP Botanists and Wetland Ecologists are experts in wetland plant identification and have worked in wetlands across the entire state. Every year, new wetland scientists and managers move to the state or take on new responsibilities that involve the need to identify wetland plants, yet there are few opportunities to learn wetland plant identification. To fill this need and to accompany the upcoming Field Guide to Colorado Wetland Plants, CNHP proposes to conduct professional trainings on wetland plant identification. Different trainings could be offered for different species groups, including 1) a general course on common wetland plants; 2) wetland graminoids (grasses, sedges and rushes); 3) willows and other woody wetland plants; and 4) common wetland forbs. Alternatively, the trainings could be focused on wetland plants specific to different regions of the state. Curricula would be developed and trainings would be held once or twice a year for at least two consecutive years.

  Timeframe: This action item is a proposed goal for which we will seek grant funding. The target timeframe for this action item is to secure funding in either 2011 or 2012 and to hold the trainings in 2012–13 or 2013–14.

- **Revise and Reprint the Field Guide to the Wetland and Riparian Plant Associations of Colorado:** In 2003, CNHP produced a Field Guide to the Wetland and Riparian Plan Associations of Colorado. This 466-page publication was based on field data collected by numerous wetland scientists over more than 10 years and describes 184 plant associations found across the states. Plant associations, or plant communities, are a much finer scale classification than the Ecological System classification mentioned above and are based on repeated patterns of species combinations (*e.g.,* Narrowleaf Cottonwood / Thinleaf Alder Woodland). The Field Guide to Wetland and Riparian Plant Associations has been a very popular resource for wetland professionals. Though highly detailed and based on extensive research, there is always a need to refine the plant association classification with data collected since its publication.

  Timeframe: This action item is a proposed goal for which we will seek grant funding. The target timeframe for this action item is to secure funding in 2013 and to produce a revised publication by 2015.

Extent and Location: Comprehensive Digital Wetland Mapping

CNHP will work with the U.S. Fish and Wildlife Service's National Wetland Inventory (NWI) Program and numerous funding partners to create a comprehensive digital map of wetlands for the state of Colorado by 2015. CNHP will be recognized as the best source of digital wetland data and will help determine the *extent and location* of wetlands across the state.

Action items

- **Compile Known Sources of Digital Wetland Data:** Digital wetland mapping from the NWI Program exists for a small portion of Colorado. Though NWI mapping is the recognized national standard, the lack of digital NWI data necessitates that alternative digital wetland mapping be used to estimate the extent and location of wetlands across the state. Several projects undertaken by various agencies and organization have involved mapping wetlands and/or riparian areas in Colorado, though each effort has targeted a different portion of the resources and followed different methods. Though a 2007 EPA Region 8 WPDG (*Statewide Strategies for Colorado Wetlands:* Assistance ID #CD-97874301), CNHP is currently compiling all major known sources of digital wetland data. In addition to NWI data, these sources include riparian mapping from the Colorado Division of Wildlife, potential playa mapping from Rocky Mountain Bird Observatory, potential fen mapping from several National Forests, and wetland mapping from two counties. These data will be used to estimate the extent and location of Colorado's wetlands.

  Timeframe: The compilation of wetland data is underway and nearly complete. All major data sources will be compiled and initial estimates of wetland acreage will be calculated by April 2011.

- **Convert Existing NWI Paper Maps to Digital Data:** All of Colorado was mapped by NWI in the early years of the program, between the late 1970s and the early 1980s. Though the mapping exists, it was all created as paper maps and not as digital data. In today's electronic era where Geographic Information Systems (GIS) are the norm, paper maps are not as useful. Acreages cannot be calculated and analyses cannot be conducted based on the paper maps. However, delineating brand new NWI maps is time consuming and expensive and many rural areas of the state have not experienced extensive change in wetland acreage since the paper maps were created.

  Starting in 2008, CNHP developed a process to convert the existing NWI paper maps into digital data using Definiens eCognition® image recognition software. In only two years, CNHP has more than doubled the amount of digital NWI data available from less than 10% of the state to nearly 20%. Current contracts will again double that figure to more than 40% mapped. This work has been supported by funding from numerous partners and is slated to continue for several years in the future.

  Timeframe: Conversion of existing NWI maps to digital data is underway through several separate projects. The overall goal is to convert all paper maps to digital data by 2015. This will be completed in several steps, some currently funded and others proposed. Separate projects planned or proposed between 2011-2015 are listed below by geographic region:

  - Yampa River Basin: 90 quads will be delineated in 2011 with funding from the BLM.
  - Routt National Forest: 45 quads will be delineated in 2011 with funding from the U.S. Forest Service.
  - White River National Forest: 123 quads will be delineated in 2011 with funding from the U.S. Forest Service.
  - Lower South Platte River Basin: 204 quads will be delineated in 2011–2012 with funding from EPA Region 8.

  - Jefferson County: 16 quads will be delineated in 2011–2012 with funding from EPA Region 8.
  - East-Central Colorado: 130 quads are proposed for digitizing, contingent upon funding from the U.S. Highway Administration's Transportation Research Board.
  - All future grant proposals for river basin-scale wetland condition assessment projects and county surveys of biologically significant wetlands will include digitizing wetland maps. The specific areas will depend on opportunities that arise each year (see the following strategic directions on wetland condition assessments and county surveys).

- **Delineate New NWI Maps for Select Areas:** Converting the original paper maps to digital data is effective for many areas in Colorado. However, certain regions have experienced rapid land use changes since the maps were produced. This is especially true along the rapidly urbanizing Front Range corridor. For those areas where the original maps no longer represent the extent and location of wetlands, CNHP will seek opportunities to delineate new NWI maps. Through a 2009 EPA Region 8 WPDG (*Mitigation in the Watershed Context:* Assistance ID #CD-97847001) and supplemental funding form a local organization, CNHP is currently creating new NWI maps for 36 quads along the northern Front Range. These new maps are based on 2009 color infra-red imagery and follow the Federal Geographic Data Commission's National Wetland Mapping Standards. As opportunities arise, additional areas will be selected for new delineation.

  Timeframe: The newly delineated NWI maps for the northern Front Range will be submitted to the NWI program by April 2011. CNHP will seek additional opportunities to create new NWI maps with a goal of creating new NWI maps for 5–10% of the state by 2015.

- **Develop an Interactive Online Wetland Mapping Tool:** In order to make all of the newly compiled and created digital wetland mapping available to the wetland community, CNHP will work with GIS Specialists at CDOW to create an interactive online mapping tool for wetlands. This tool will display all compiled and generated wetland polygons along with background aerial imagery, topographic maps, and shaded relief. In addition, the tool will show land ownership, river basin and ecoregion boundaries, and will summarize all of CNHP's information related to wetlands of high biodiversity significance.

  Timeframe: The interactive online wetland mapping tool is funded by a 2007 EPA Region 8 WPDG (*Statewide Strategies for Colorado Wetlands:* Assistance ID #CD-97874301). The tool is currently under development and the first iteration will be complete by April 2011.

- **Monitor Change in Wetland Area Over Time:** A comprehensive digital map of wetlands in Colorado will be a significant accomplishment for the state. However, the NWI maps are a snapshot of wetland acreage in a given year. In order to fully understand whether we are gaining or losing wetland acres, it is important to monitor the change over time. This can only be done by re-mapping certain sections of the state at repeated intervals. Once we have digital wetland mapping for a majority of the state, CNHP will pursue opportunities to re-map select areas to estimate trends. This could be accomplished by re-mapping a small portion of the state (1–5%) each year. The particular areas could be selected using a random sample approach to ensure distribution across the state.

  Timeframe: This action item is a proposed goal for which we will seek grant funding. The target timeframe for this action item is to secure funding starting in 2014 in order to begin re-mapping areas in 2015. Ideally, we would seek funding that could continue over several years to monitor change over time.

Wetland Condition Assessment Protocols

CNHP will continue to refine wetland condition assessment protocols developed over the past 5 years and will promote their use to public and private entities conducting wetland condition assessments. These protocols follow both the EPA's Level 1-2-3 framework[1] and Ecological Integrity Assessment (EIA) framework of the NatureServe Network.[2]

Action items

- **Develop a Landscape Integrity Model for Wetlands (Level 1):** Within the EPA Level 1-2-3 framework, Level 1 assessment tools rely on geospatial data, such as GIS layers and remote sensing. As part of a 2007 EPA Region 8 WPDG (*Statewide Strategies for Colorado Wetlands:* Assistance ID #CD-97874301), CNHP is developing a coarse assessment of wetland stressors based on numerous statewide GIS layers. The resulting GIS model will be a first draft towards a rigorous Level 1 assessment tool. In the future, we will test the outputs from this model with field data collected through wetland assessments across the state and refine the model inputs and formula to better reflect condition on the ground. This may be carried out through a standalone project or may be incorporated as an element of future condition assessment projects. A robust Level 1 tool could be used by many of our wetland partners for predicting the condition of wetlands in areas of the state where field-based assessments have not been conducted.

  Timeframe: The initial development of the Landscape Integrity Model for Wetlands is being carried out as part of a funded project. The draft model will be finalized by April 2011. This initial model will need refinement in future years and we will seek funding for refinement as either a standalone project or as a component of future wetland condition assessment projects. We will seek funding by or before 2013 to develop a refined version of the Level 1 tool by 2015.

- **Refine Rapid Wetland Assessment Protocols (Level 2):** Within EPA's Level 1-2-3 framework, Level 2 tools can be completed in the field within a few hours using simple, qualitative or semi-quantitative indicators. Ecological Integrity Assessment (EIA) methods developed NatureServe and member program can be used as Level 2 protocols and include metrics from four different attribute classes: landscape context, biotic condition, abiotic condition, and size. In 2006, CNHP created draft EIA protocols for several wetland types in Colorado with funding from the EPA and CDOW. Draft reports are available in the 2006 section of our reports page (http://www.cnhp.colostate.edu/download/reports.asp). One of these draft protocols (Subalpine-Montane Riparian Shrublands) was tested in 2007 and a report describing the results is available under the 2009 section of the same reports page.

  The EIA protocols have since been used in two basinwide wetland assessments (Rio Grande Headwaters and North Platte River Basin, see next strategic direction for more information). Through each project, the methods have been refined to ensure that they are intuitive, consistently applied, and adequately capture the range of condition of Colorado wetlands. To date, however, these protocols have only been tested in the Southern Rocky Mountain Ecoregion of the state. Starting in 2011, with funding from a 2010 EPA Region 8 WPDG (*Lower South Platte Wetland Profile:* Assistance Agreement in process), CNHP will begin a 3-year project using these and other tools to assess the condition of wetlands in the High Plains Ecoregion. Through that project and others in the future, CNHP will continue to improve the Level 2 EIA protocols.

[1] For more information on EPA's Level 1-2-3 framework, see http://www.epa.gov/owow/wetlands/pdf/techfram.pdf

[2] For more informaiton on NatureServe's EIA framework, see: http://www.natureserve.org/publications/EPA-Wetland-Mitigation.jsp

Timeframe: Improvements based on the Rio Grande Headwaters and North Platte wetland assessments are currently underway. The field forms and manuals from each project will be released with final project reports in 2011. Improvements based on subsequent assessments will be released in future years.

- **Expand Intensive Field Protocols (Level 3):** Within the EPA's Level 1-2-3 framework, Level 3 tools are intensive site assessments that focus on a particular attribute class and require in-depth, quantitative measurements. Level 3 assessments are used to calibrate and validate Level 1 and Level 2 assessments, and the scoring thresholds for Level 3 protocols are developed based on intensive monitoring of reference wetlands that span a disturbance gradient. CNHP has developed two vegetation-based Level 3 tools for wetlands: Floristic Quality Assessment (FQA) and Vegetation Index of Biotic Integrity (VIBI). Both were supported by EPA and CDOW and several reports about these tools written between 2006 and 2009 are available on our website (http://www.cnhp.colostate.edu/download/reports.asp). These tools have been used along with EIA metrics in both the Rio Grande Headwaters and North Platte basinwide wetland assessments. They will continue to be used in future assessments.

  The vegetation-based Level 3 tools developed to date are important measures of wetland condition. However, the models should not be considered fully validated until we have data from more reference condition sites across the state. In addition, the tools were developed based on a limited set of wetland types. To ensure that our assessment tools can be applied consistently and reliably to all wetlands across Colorado, it is important to refine and expand our Level 3 tools. CNHP will seek opportunities to further validate existing VIBI models and create new VIBI models for additional wetland types, particularly wetland types on the eastern plains. We also recognize that vegetation is only one aspect of wetland condition. There are several other aspects of overall wetland condition, such as water quality, soil properties, and invertebrates. CNHP will seek opportunities to develop additional Level 3 protocols that represent additional wetland attributes.

  Timeframe: Minor improvements to the FQA and VIBI protocols will be made through the Rio Grande and North Platte wetland assessments and will be described in final project reports in 2011. CNHP will seek additional funding to develop new VIBI models for additional wetland types or to develop Level 3 protocols for additional attributes of wetland condition. There is no specific timeframe for this objective.

- **Create Data Management Tools:** In order to efficiently handle and analyze data collected using the Level 1, 2, and 3 protocols, data management tools are needed. Beginning in 2008 with the *Statewide Strategies for Colorado Wetlands* project, CNHP has been creating data management tools that parallel development of our protocols. The primary tool is a Colorado Wetland Condition Assessment Database that allows users to input data collected following our protocols and to calculate scores based on the EIA, FQA, or VIBI methods. Through a 2009 EPA Region 8 WPDG (*Colorado Wetland Tools:* Assistance ID #CD-97847301), CNHP will finalize this database and make it available to the general public through our website.

  Timeframe: The initial version of the database is complete and has been used for CNHP's internal wetland data. Refinement of this database is being funded by a 2009 WPDG and a final public version will be made available on our website by April 2012.

- **Conduct Trainings on Condition Assessment Protocols:** The tools developed by CNHP could be used by numerous different entities to evaluate wetland condition. Transferring the knowledge and methods developed to the wetland community is an important goal of both CNHP and our funding partners. To this end, CNHP will organize and conduct trainings on our wetland condition assessment protocols.

Timeframe: This action item is a proposed goal for which we will seek grant funding. The target timeframe for this action item is to secure funding in either 2011 or 2012 and to hold the trainings in 2012 or 2013.

- **Long-term Monitoring of Reference Condition Wetlands:** The condition assessment tools developed by CNHP are based on our current understanding of reference condition or "minimally disturbed" wetlands. To date, reference wetlands included in this process have been concentrated in specific areas of the state, all within the Southern Rocky Mountain Ecoregion. To build more confidence in our methods, we are expanding the set of reference condition wetlands considered in our models. CNHP will seek to identify reference wetlands in each river basin and will develop a reference network that covers the entire state. This will allow us to tease apart differences in metrics that relate more to geography and natural variation than to actual condition.

  The second important benefit of establishing a reference set of wetlands across the state is that these sites can be used to monitor change in wetland condition over time due to long-term and large-scale phenomena like climate change and large-scale insect outbreaks. This requires repeated visits to sites over many years.

  Timeframe: Both aspects of this action item benefit from past and current funding but also require additional funding to be fully realized. Through past and ongoing projects, many reference wetlands have been identified and surveyed in the Southern Rocky Mountain Ecoregion. Through a 2010 EPA Region 8 WPDG (*Lower South Platte Wetland Profile:* Assistance Agreement in process), CNHP will select reference wetlands in the Lower South Platte basin. In each subsequent year, CNHP will seek grant funds to continually expand this reference network. As a separate project, CNHP may also seek funds to make repeat visits to a set of the reference wetlands across the state on a 5-year interval to monitor potential changes over time due to long-term and large-scale processes.

Probabilistic Wetland Condition Assessments

CNHP will conduct probabilistic assessments of wetland condition for all river basins at the 6-digit hydrologic unit code (HUC) level by 2020. Beyond 2020, these assessments could be repeated at 10 year intervals to monitor change over time. CNHP will also participate in national assessments of wetland condition.

Action items

- **Conduct Basin by Basin Wetland Condition Assessments:** The EPA strongly recommends that each state monitor its aquatic resources, including wetlands, using a probabilistic random sample design to make statistically valid statements about the condition of those resources. In 2008, using the condition assessment tools described above, CNHP began a series of river basin scale wetland condition assessment projects. The first was a pilot wetland condition assessment in the Rio Grande Headwaters River Basin and was supported by a 2007 EPA Region 8 WPDG (*Statewide Strategies for Colorado Wetlands:* Assistance ID #CD-97874301). The second project was conducted in the North Platte River Basin and was supported by a 2008 EPA Region 8 WPDG (*Basinwide Wetland Profile of the North Platte River Basin:* Assistance ID #CD-97854101). Data analysis is still underway for both projects. The third project will be conducted in the Lower South Platte River Basin and will be supported by a 2010 EPA Region 8 WPDG (*Lower South Platte Wetland Profile:* Assistance Agreement in process).

  CNHP plans to implement a rotating basin survey strategy, by starting a new river basin study every one to two years depending on resource availability. We intend to conduct one survey in every HUC 6 river basin by 2020. In some instances, smaller HUC 6 basins will be combined with neighboring basins. In other cases, the largest HUC 6 basins will be divided in two. We will select the river basins to study depending on interest of partner agencies. Based on the two surveys already conducted, we have begun to standardize both the study design and field protocols. More detailed information is available in the Quality Assurance Project Plans (QAPPs) developed for both studies.

  Timeframe: This action item is ongoing and will continue for many years into the future. The initial pilot study of the Rio Grande Headwaters River Basin involved three years of data collection and the final report will be available in April 2011. The North Platte River Basin project will be completed in December 2011. The Lower South Platte River Basin project was recently awarded and will be carried out between 2011 and 2013. Funding for additional basins will be sought in subsequent years.

- **Conduct Sampling for the National Wetland Condition Assessment:** In the early 2000s, the EPA began the National Aquatic Resource Surveys to assess the condition of the nation's aquatic resources. In 2011, EPA and the states will carry out the nation's first assessment of wetland condition across the entire country. CNHP has been involved in the development of field protocols for this survey and has served on several working groups to support it. In 2011, CNHP will conduct the field sampling for this project in both Colorado and neighboring Wyoming. CNHP will also remain engaged with the National EPA Wetlands Team as they analyze the field data and prepare the report. This survey is schedule to be conducted every 5 years. CNHP will continue to be the organization responsible for carrying out the field work in Colorado and will also conduct sampling in Wyoming until a Wyoming-based partner is identified.

  Timeframe: Sampling for the first National Wetland Condition Assessment will be carried out in 2011. Subsequent surveys will be carried out every 5 years; CNHP will seek funding to participate in future surveys.

Biodiversity Significance

Wetlands with High Biodiversity Significance

CNHP will continue to be the leading organization that identifies and tracks wetlands of high biodiversity significance. This has been the core work of CNHP for over 15 years and will continue to be a major focus of our wetland plan.

Action items

- **Conduct Surveys for Wetlands with High Biodiversity Significance:** For over 15 years, CNHP has conducted surveys to locate and track occurrences of biologically significant wetland communities and populations of uncommon wetland plants and animals. This is one of the core research activities of CNHP and these studies often include upland communities, plants, and animals as well as their wetland counterparts. A map of counties surveyed by CNHP is available at: http://www.cnhp.colostate.edu/download/maps.asp#county_inventory. The data collected through these surveys are housed in our Biotics database, which contains thousands of records throughout Colorado and allows CNHP to rank and track areas of high biodiversity significance. CNHP will continue to seek funding for surveys of significant wetland elements; these studies may be at the county scale or at alternative scales such as watersheds, planning areas, or eco-regions.

  Timeframe: This action item is ongoing and will continue for many years into the future. Typically, CNHP conducts one or two surveys a year, often at the county level. Currently, CNHP is finishing reports for wetland surveys in Gilpin and Teller Counties. A survey of wetlands in Jefferson County is scheduled for 2001. All three of these surveys have been supported by EPA Region 8 WPDGs and state and county partners. Throughout the planning period, CNHP will continue to seek funding for at least one wetland survey per year.

- **Conduct Surveys for Fen Wetlands:** Fens are permanently saturated, groundwater-fed wetlands that accumulate thick organic soil layers over hundreds and thousands of years. In the Rocky Mountains, they are old-growth wetlands that house many globally and state rare plant and animal species, help regulate regional hydrology, and store significant quantities of soil carbon. Because of their significance, these wetlands have received considerable attention in the past decade from resource managers in the US Forest Service and BLM, who administer much of the high elevation land where fens are found. With the support of these and other partners, CNHP will conduct surveys specifically for fen wetlands and the uncommon wetland elements found within them.

  Timeframe: This action item is supported by past and current funding, primarily from the US Forest Service. Where interest and need arises, CNHP will seek additional funding for fen surveys in the future.

- **Participate in Conservation Planning:** Through CNHP's surveys for biologically significant wetlands elements, including fens, CNHP has identified specific locations across the state as prime candidates for conservation action. These are called Potential Conservation Areas (PCAs) and are available as geospatial data and descriptions via our website. Overview map of PCAs available at: http://www.cnhp.colostate.edu/download/gis/PCA_Map07_2010.pdf. Using these PCAs as a resource, CNHP will work with local and state governments and conservation organizations to protect significant elements through local and regional planning processes. CNHP has a conservation planning team whose focus is working with partners to help prioritize where conservation efforts will be most effective. We will continue this work with wetlands in mind where interest and opportunity arises.

  Timeframe: Defining PCAs is a part of all surveys for biologically significant wetlands. CNHP will seek to continue that work and will also engage with partners wherever possible to help them translate CNHP's data and information into conservation action.

- **Identify Priority Wetlands for Protection Status:** Through federal and state legislation, including the Federal Clean Water Act (CWA), several mechanisms exist to protect specific wetlands and wetland types from development or degradation. These include "Red Flag Wetlands" for protection under Section 404 of the CWA and Outstanding Natural Resource Waters (Wetlands) listed in the state anti-degradation policy. Data collected by CNHP through both wetland condition assessment projects and surveys for biologically significant wetlands could be used to identify priority wetlands in the state that deserve this level of protection. CNHP will work with partners in the regulatory community, including ACOE, EPA, and CDPHE to identify wetlands and wetland types that warrant this level of protection.

  Timeframe: This action item is a proposed goal for which will we seek funding and partnerships in the future. The target timeline is to engage with the ACOE and CDPHE regarding protection status of specific wetland by 2014.

- **Produce an Atlas of Colorado Wetlands:** To educate the general public about the considerable beauty, uniqueness, and value of Colorado's wetlands, CNHP proposes to produce a full color publication that highlights examples of the very best and most significant wetlands in the state. This book would be called the *Atlas of Colorado Wetlands* and could contain multiple photographs of each site, a description of the site, lists of species found, and reasons for selection as a significant wetland. The book could also contain general information about Colorado wetlands and fun facts to engage readers. This publication would be a printed book, but could also be formatted to be a component of the CNHP Wetlands Website.

  Timeframe: This action item is a proposed goal for which we will seek grant funding. The target timeframe for this action item is to secure funding by 2014 and to publish the Atlas by 2016.

Empowering Partners

Empowering Public and Private Partners

CNHP will coordinate and partner with federal, state, and local agencies as well as with conservation organizations and local citizens to transform the information gained through the previous strategic directions into effective conservation and management.

The action items in this last strategic direction are general in nature and suggestive of the relationship CNHP will foster in the future. There may be partners and relationships not listed below that emerge over the planning period. We will seek opportunities for productive partnerships in many different areas to make the best use of the data we collect.

Action items

- **Help CDOW Plan Restoration Priorities and Evaluate Wildlife Habitat:** CNHP has a long, successful relationship with CDOW's Wetland Wildlife Conservation Program. Currently, we have partnered with CDOW in two areas of our work. 1) CDOW provided the matching funds that make the *Colorado Wetland Tools* project possible (2009 EPA Region 8 WPDG: Assistance ID #CD-97847301). CDOW is very interested in the resources that will come from this project, including the *Field Guide to Wetland Plants,* the Ecological System descriptions, and the Colorado Wetland Website. 2) CDOW is the main state partner involved in our basinwide wetland condition assessment projects. The goal of these projects is to provide quantitative information about the extent and condition of wetland habitat resources within each basin to assist CDOW in prioritizing funding for wetland restoration. In order to know that the data we collect will serve this function, we are also working with CDOW to research habitat requirements of CDOW's target wetland wildlife species and identify diagnostic metrics we can record in the field or generate through GIS analyses to evaluate habitat quality. Over the coming years, we will continue to foster this collaboration and produce data products that help the CDOW meet its program goals.

  Timeframe: Our collaboration with CDOW is ongoing and supported by numerous grants. We will continue to develop this relationship in the coming years.

- **Help ACOE Plan Wetland Mitigation in the Watershed Context:** In 2008, the EPA and ACOE issued guidance that requires wetland mitigation decisions to be made with the watershed context in mind. Unfortunately, the lack of spatial data for wetlands in Colorado hinders this process. Furthermore, the guidance issued is broad and contains few specifics on implementation. Through a 2009 EPA Region 8 WPDG (*Mitigation in the Watershed Context:* Assistance ID #CD-97847001), CNHP has partnered with CSU Researcher Dr. Brad Johnson, EPA, ACOE, and the Colorado Department of Transportation (CDOT) to develop a framework for making wetland mitigation decisions using the watershed approach. CNHP brings to the partnership expertise in wetland mapping, wetland condition assessment, and ranking of biologically significant wetlands, all components that should be evaluated through the watershed approach. CNHP will continue this partnership through the project end in 2012 and seek future opportunities to use data to guide effective regulatory decisions.

  Timeframe: Our relationship with ACOE is currently supported by a WPDG that will last through 2012. We will seek opportunities to continue this relationship in the coming years.

- **Help CDPHE Report on Wetland Condition for Integrated Reporting Requirements:** Every two years, CDPHE is required to produce an integrated report on water quality monitoring and assessment to the EPA. To date, CDPHE has not included wetland quality in their reports, though wetlands are considered to be "waters of the U.S." Using data generated through basinwide wetland condition assessments, CNHP will work with CDPHE to create a new section in the integrated report for wetland condition.

Timeframe: Our relationship with CDPHE is very new. We have met with staff responsible for the integrated report and the idea of including wetland condition was favorably received. We will continue to build this relationship in the coming years and hope to include summary data for both the Rio Grande and North Platte River Basins in the 2010 integrated report. If this proves successful, we may seek additional funding to work with CNHPE on future basinwide assessments.

- **Help Land Management Agencies Meet Objectives for Wetlands:** It is the objective of many federal, state and local land management agencies to manage and protect valuable wetland resources. To this end, they require information on the location and extent, condition, and biodiversity importance of wetlands. CNHP will work with partner agencies to produce and deliver the information they need to meet their goals. In some instances, this may be a contract for wetland mapping; in other instances, it may be an on-the-ground survey of wetlands in a particular area; in still other instances, this may mean using existing CNHP data to recommend conservation priorities. CNHP will continue to foster all relationships with land management agencies in Colorado and will provide them with high quality information about wetlands.

  Timeframe: This action item represents numerous ongoing relationships that we will continue to foster and develop throughout the planning period.

- **Provide Data to State Planning Processes on Water Supply and Demand:** Currently, the State of Colorado is engaged in a multi-year planning process regarding water supply and demand. This process is facilitated by the Colorado Water Conservation Board (CWCB) through a set of Basin Roundtables. In 2009, CNHP conducted a survey of biologically significant wetlands in the North Platte River Basin for the North Platte Basin Roundtable. However, to date, this is the only project through which CNHP has engaged directly with the CWCB process. Wetlands are a vital component of the hydrological cycle in Colorado and wetland data should be incorporated into CWCB models. Changes in water use patterns are also likely to affect wetlands in portions of the state with forecasted population growth. CNHP will seek opportunities to engage with CWCB and related partners to integrate wetlands into planning for water supply and demand.

  Timeframe: This action item is a proposed goal for which we will seek funding in the coming years. The target timeframe is to engage with the South Platte Basin Roundtable through the upcoming 2010 EPA Region 8 WPDG in the Lower South Platte River Basin and to seek opportunities to share data. This may result in new project that focus on the relationship between water use patterns and wetlands.

- **Provide Data to Conservation Partners:** Along with the agencies listed above, there are numerous non-governmental organizations working towards conservation goals, such as The Nature Conservancy, Rocky Mountain Bird Observatory, Ducks Unlimited, Trout Unlimited, local watershed groups, land trusts, and others. CNHP's data on wetlands are a vital resource to help these organizations plan conservation priorities. CNHP will seek to make connections with conservation organizations in all areas of the state. These partners are essential in transforming information into action.

  Timeframe: This action item represents numerous ongoing collaborations that we will continue to foster and develop throughout the planning period.