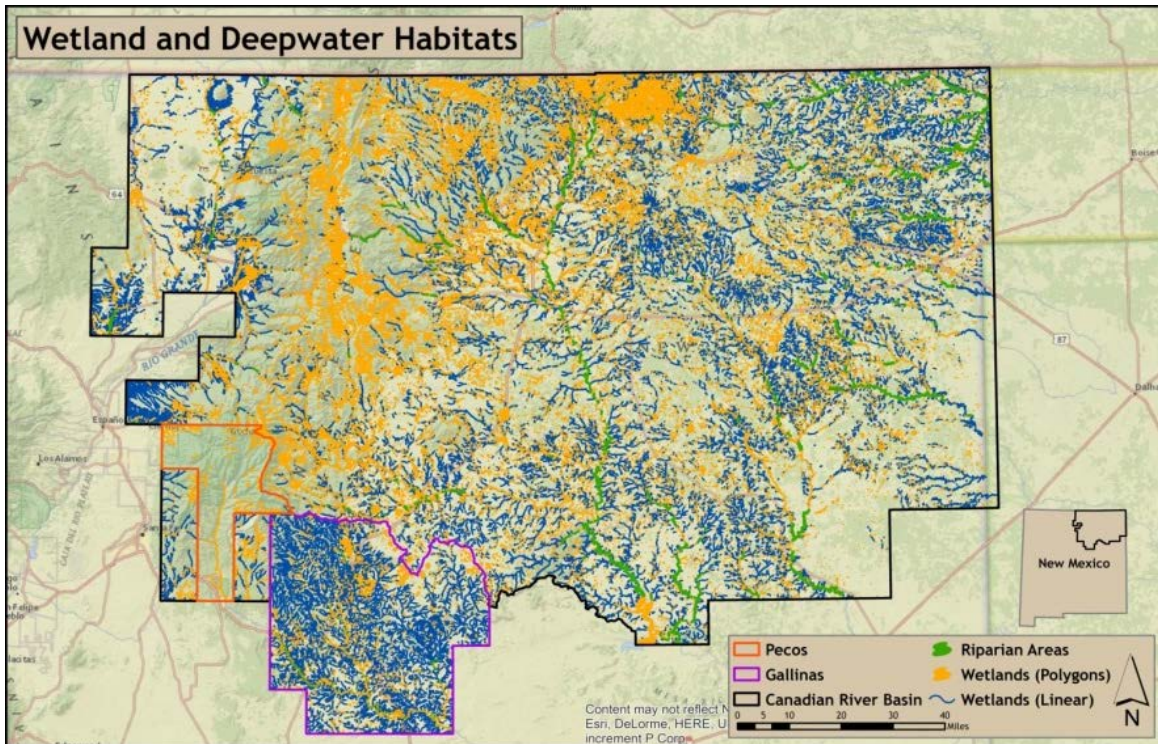


**Final Report**  
**April 2016**  
**Mapping and Classification for Wetlands Protection,**  
**Northeastern New Mexico Highlands and Plains**  
**Assistance Agreement No. CD-00F057-01-0 (FY2009)**



**Cowardin map of wetlands, riparian areas and deepwater habitats in northeastern New Mexico produced by this project.**

**New Mexico Environment Department**  
**Surface Water Quality Bureau**  
**Wetlands Program**



**Figure 2. Slope wetlands at Angel Fire, NM during map book review by Maryann McGraw (WPC) and Arlene Gaines (EPA PO) September, 2015.**

## **Project Goals and Accomplishments**

The New Mexico Environment Department Surface Water Quality Bureau Wetlands Program (SWQB Wetlands Program), in cooperation with the Saint Mary's University of Minnesota Geospatial Services (GSS) and a Project Advisory Committee, have completed mapping and classification of wetland resources in northeastern New Mexico and in US Forest Service (USFS) Wilderness Areas as part of our Landscape Level 1 assessment strategy. Mapping includes Cowardin (Cowardin et al., 1979) classification of all wetlands in the project area including linear wetlands, playas and isolated wetlands, and deepwater habitats in the Canadian, Dry Cimarron, Upper Gallinas, Upper Pecos and Upper Rio Grande drainage areas. Also, riparian areas were mapped and classified in these areas according to A System for Mapping Riparian Areas in the Western United States (USFWS, 2009). The landscape position, landform, water flow path, water body type (LLWW) mapping classification and descriptors (Tiner, 2011) was applied to all wetlands (including USFS Wilderness Area wetlands) in order to bridge the gap between the habitat attribute classification of Cowardin and hydro-geomorphic attribute classification (LLWW), so that wetland function and performance could be described. A suite of functions were assigned by wetland type as well as their performance of each function relative to other wetlands. Hydrogeomorphic (HGM) subclasses were then applied to all wetland types to prepare for our NMRAM development in the Canadian River and Dry Cimarron River watersheds. This entire landscape level assessment was tailored to arid region wetlands representing the first demonstration of this classification

suite in the west. These data are stored in an NMED wetlands geodatabase and will be available on the SWQB Wetlands Program website in the near future. The Cowardin Classification of these wetlands is available on the USFWS National Wetlands Inventory Wetland Mapper (excluding linear wetlands) and can be accessed at <https://www.fws.gov/wetlands/data/mapper.html>. The project included the completion of LLWW application, identification of functions and HGM classification of all USFS Wilderness wetlands currently protected under Outstanding National Resource Waters (ONRW).

The project included significant outreach and technical transfer components to let stakeholders in New Mexico, and on a national level, know that these wetland mapping products exist. Outreach included presentations and transfer of products to Watershed Groups in the project area which resulted in map products being used for four Wetland Action Plans. Interactive PDF map books were made for 10 select areas. These map books are available for citizens and groups to interact with map products in a PDF format when ARC GIS is not accessible. Technical Transfer was also completed through national webinars at 2013 ASWM meeting and for the National Wetlands Mapping Consortium. A poster display and handouts were presented at several meetings around New Mexico and at the 2015 Quivira Conference. The Project Officer for this project attended New Mexico Geospatial Advisory Committee meetings monthly in order to present this project to the GIS community and to foster partnerships to obtain new collateral datasets and other support for wetland mapping. SWQB Wetlands Program Staff attended EPA sponsored meetings and technical training in order to increase the capability of the Wetlands Program.

This project will support future wetlands standards development including preparation for wetlands narrative water quality standards, identifies wetland HGM subclasses for on-the-ground NMRAM data collection and other monitoring efforts, helps build our set of reference wetland sites, contributes to the selection of restoration sites, and will inform our CWA Section 401 Certification conditions. This project provides the demonstration of important and versatile tools for understanding wetlands resources in northeastern New Mexico.

The project has contributed significantly to the advancement of the New Mexico Wetlands Program in even more important ways. The project provides an assemblage of wetlands information for major river basins in New Mexico where little wetlands information or mapping was previously available. The project provided mapping and wetland function information for the development of four Wetlands Action Plans during the project period including the Comanche, Upper Gallinas, Upper Pecos, and Moreno Valley Watersheds. Amigos Bravos, a local NGO, used the mapping products to identify "Wetland Gems," important headwater wetlands and highly functional wetlands in the Carson National Forest. The intent is to provide special measures to protect these wetlands as part of the current Forest Plan Revision. The Army Corps of Engineers is using the map products to develop mitigation measures for CWA 404 Permits. The NRCS is interested in the map products for their ecological site descriptions of wetland soils. The SWQB Wetlands Program is using the information for developing wetlands

narrative standards by HGM subclass, and for identifying reference domains and wetland subclasses for NMRAM application. This project is also the model for four more current mapping projects funded by EPA Wetlands Program Development Grants including the Jemez Mountains and surrounding areas, the Sacramento Mountains area, the Middle Rio Grande (MRG) and mountain ranges east of MRG, and the Gila/San Antonio watersheds and surrounding areas in the southwest corner of New Mexico.

## **Description of the Project**

Project tasks included conducting RFPs for mapping contractors, acquiring imagery and assembling a geodatabase, conducting a literature search and working with NMED GIS staff to obtain corroborative data, pre- and post-mapping field reviews, developing an LLWW draft classification for the project area with the help of a Project Advisory Committee, creating a landscape level assessment, assigning subclasses including demonstrating the use of the USFS Valley confinement tool, collaborating with our contractor GSS through Go-to Meeting venues, developing reports, and extensive outreach to promote the use of the mapping products. Technology transfer includes presentations at a variety of venues in New Mexico and through webinars with a national audience, including the map products on the National Wetlands Inventory Mapper and soon on the NMED mapper, development and distribution of a brochure, creation of a poster session, development and distribution of interactive PDF mapbooks for 10 important wetland sites in Northeastern New Mexico, and information posted on the NMED Wetlands website at <http://www.nmenv.state.nm.us/swqb/Wetlands/>.

The SWQB Wetlands Program completed several wetland mapping products for the Canadian River watershed, the Dry Cimarron watershed, and portions of the Upper Gallinas and Upper Pecos and Upper Rio Grande watersheds from the CO/NM border to Conchas Reservoir, including linear wetlands, playas and isolated wetlands, deepwater habitats and riparian areas in Union, Colfax, Taos, Mora, Harding and parts of San Miguel, Santa Fe, and Rio Arriba Counties. The Cowardin Classification was applied to all wetlands listed above. As a demonstration the LLWW mapping classification was tailored to arid west wetlands (Tiner, 2011). In addition, 5 quads in the Upper Pecos river, 27 quads in the Gallinas watershed, and all ONRW Wilderness wetlands previously mapped and classified by the New Mexico NWI Coordinator to NWI standards were classified with the LLWW classification scheme and included in the landscape level functional assessment. All mapping was at 1:12,000 resolution or better to comply with the FGDC National Wetlands Mapping Standard. The Project Advisory Committee was established to ensure proper application of LLWW. New Mexico is in the process of developing their NMRAM which combines the assessment of wetland condition with function for restoration, planning and regulatory applications. The LLWW provided the necessary information to help assign wetlands to subclasses for NMRAM development. NM participated in the Association of State Wetland Managers Wetland Mapping Consortium, the NM Wetlands Roundtable and other GIS consortiums such as the New Mexico Geospatial Advisory Committee (GAC) in order to share information and find partnerships for future wetland mapping initiatives, such as the acquisition of LIDAR and other important collateral data sets.

## Project Outcomes

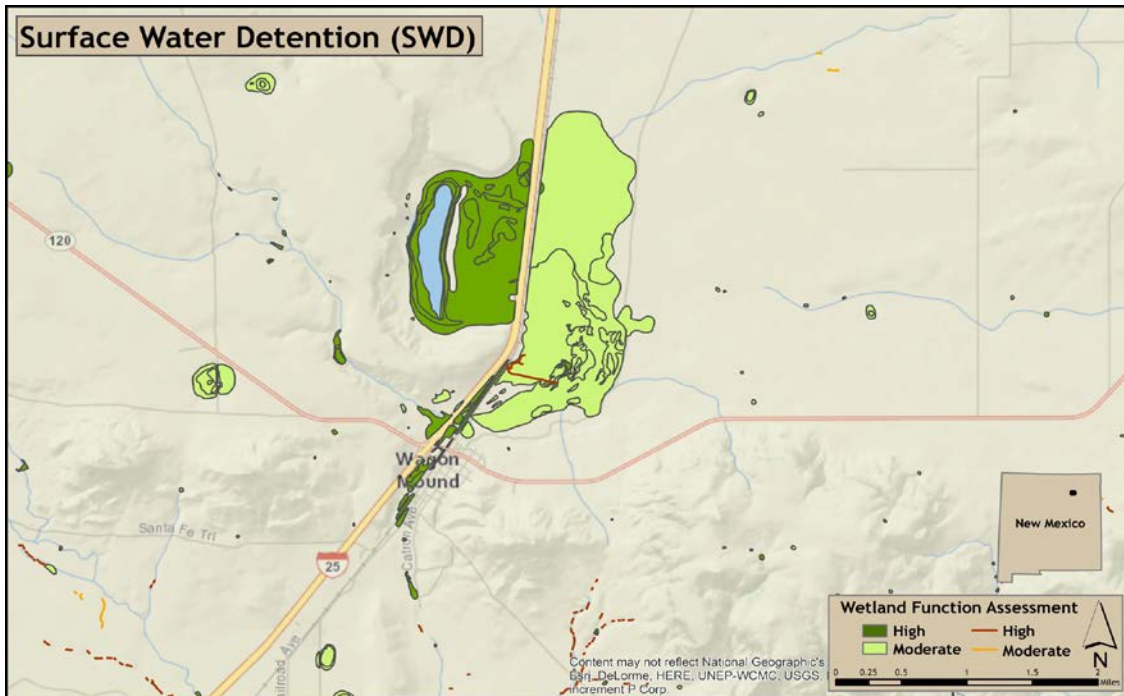
- This project mapped wetlands within 19,755 square miles (12,643,344 acres) of New Mexico land area. This is more than three times the land area proposed (5,800 sq mi) at the beginning of the project. Based on the final mapping 163,355 acres (1.3 percent) are wetland, deepwater or riparian habitat. Palustrine system wetlands make up 82% of the wetlands, lacustrine 14%, and riverine 4% based on the Cowardin Classification system.
- The study areas covered by this project included the Canadian River watershed, the Dry Cimarron watershed, the Upper Gallinas watershed, the Upper Pecos watershed, the Upper Rio Grande Watershed and all USFS Wilderness wetlands.
- Classification of wetlands using the FGDC National Wetlands Mapping Standard, combined with the addition of LLWW descriptors and the development of a wetland functional correlation table for Northeastern New Mexico, provided the opportunity to assign functional attributes to all wetland habitats in the project area. Assignment of twelve different functions where applicable was possible from the mapping products (Table 1). Functions were also categorized as either high or moderate relative to other wetlands for the performance of specific functions (Figure 3).

<b>Function</b>	<b>Description</b>
Aquatic Invertebrate Habitat	Provides habitat for aquatic invertebrates
Bank and Shoreline Stabilization	Wetland vegetation helps bind soil to limit or prevent bank and shoreline erosion
Carbon Sequestration	Serves as carbon sinks that help trap and store atmospheric carbon
Fish Habitat	Provides habitat for a variety of fish (including a special category containing factors that maintain cold water temperatures for certain species including trout)
Groundwater Recharge	Sustains sub-surface water storage, base flow and hyporheic exchange.
Nutrient Transformation	Encourages the cycling of nutrients from natural sources or anthropogenic sources.
Sediment and Particulate Retention	Acts as filters to physically trap sediment particles before they are carried further downstream
Streamflow Maintenance	Provides a source of water to sustain streams from drying up during periods of drought conditions or low discharge
Surface Water Detention	Stores runoff from precipitation events or spring melt waters which reduce the force of peak flood levels downstream
Unique, Uncommon, or Highly Diverse Wetland Plant Communities	Sustains natural vegetation and ecosystems including unique and uncommon wetland types and rare species



Waterfowl and Water Bird Habitat	Provides habitat for waterfowl and other water birds
Wildlife Habitat	Provides habitat for a variety of wildlife (resident and migratory)

**Table 1. Functions mapped in the project study area.**



**Figure 3. Sample of wetland mapping of functions. The map shows where wetlands are performing the Surface Water Detention function as well as its performance of that function relative to other wetlands.**

- All associated riparian areas were mapped and classified according to A System for Mapping Riparian Areas in the Western United States (USFWS, 2009). In addition to mapped polygons, all linear wetlands were mapped in the project area. Reference domains for each wetland subclass can then be delineated for future NMRAM Assessment.
- All mapped wetlands including isolated and linear wetlands were assigned to an HGM Subclass. A table of subclasses mapped is shown in Table 2. A sample of HGM mapping is shown in Figure 4.

HGM Class	HGM Subclass	HGM Modifier
Depressional	Playa	Excavated Inflow
Excavated Outflow		
Excavated Vertical Flow		
Inflow		
Outflow		
Vertical Flow		
Artificial	Excavated	

Impounded		
Pond Fringe Excavated		
Pond Fringe Impounded		
Natural	Inflow	
Outflow		
Vertical Flow		
Bidirectional Throughflow		
Throughflow		
Pond Fringe Inflow		
Pond Fringe Outflow		
Pond Fringe Throughflow		
Pond Fringe Vertical Flow		
Riverine	Sub-alpine alpine	Null
Alluvial Fan		Null
Episodic		Null
Montane-Unconfined		Null
Montane Canyon Confined		Null
Lowland Unconfined		Null
Lowland Canyon Confined		Null
Slope	Headwater	Springfed
D1luv1a1sNull		
		Null
Other	Inflow	
Outflow		
Vertical Flow		
Through Flow		
Lacustrine Fringe	Lake	Null
Flats	Mineral	Null
Organic		Null

**Table 2. HGM Classes, subclasses and modifiers used in the project study area.**

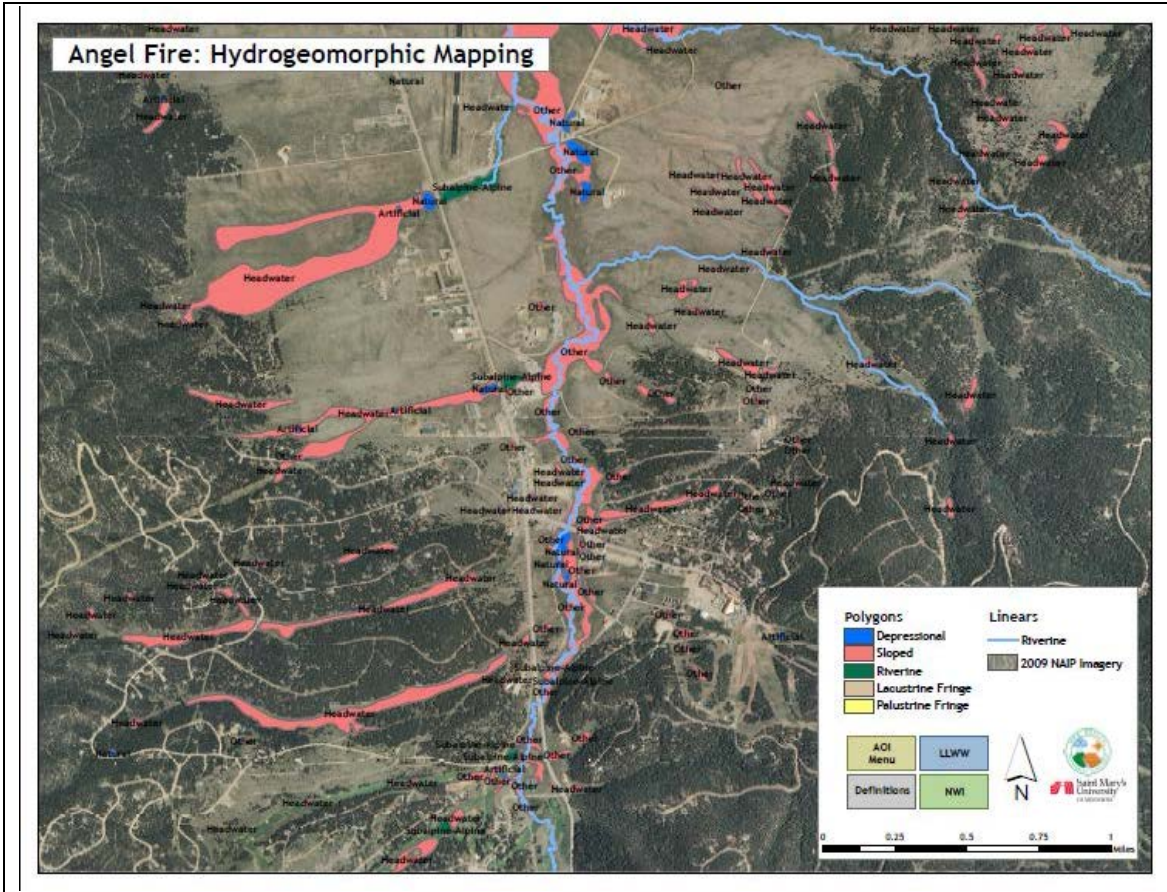


Figure 4. Example of hydrogeomorphic mapping in the Angel fire area.

- The Wetlands Program was able to hire a Wetlands Project Officer (WPO) near the beginning of the contract work for this project. The WPO was 50% State-Funded in order to provide match to Wetlands Program Development Grants. This freed up some of the personnel funding for this project for additional mapping in the project area.
- Our mapping contractors were able to calculate wetland acreage by wetland type and linear wetlands by linear foot. They also provided calculations of wetlands providing each of the functions (Table 3). The Wetlands Program now has the capability of determining where and how much of a wetland type is represented in the mapping area. These amounts are reported in the final report provided by our contractors and attached to this Final Report to EPA.





**Figure 5. This semi-permanently flooded wetland located on Millicent Rodgers Road in Taos, New Mexico is rated high for groundwater recharge. The wetland is coded in NWI as *PEMIF* (Palustrine Emergent Persistent, Semi-permanently Flooded) and is located over a layer of alluvium in the New Mexico geology layer (Photo, SMUMN GSS).**

Wetland and Aquatic Habitat Functional Assessments				
	Acerage	Linear Feet	% of Project Area	% of Wetlands
Project Area	12,643,344	N/A	N/A	N/A
Uplands	12,479,989	N/A	98.71%	N/A
Wetlands	163,355	98,782,254	1.29%	100%
Function Level				
	Acerage	Linear Feet	% of Project Area	% of Wetlands
<i>Surface Water Detention (SWD)</i>				
High Polygon	29,152	N/A	0.23%	17.85%
Moderate Polygon	51,424	N/A	0.41%	31.48%
<i>Streamflow Maintenance (SM)</i>				
High Polygon	30,158	N/A	0.24%	18.46%
Moderate Polygon	36,601	N/A	0.29%	22.41%
High Linear	N/A	197,960	N/A	0.20%
Moderate Linear	N/A	10,645,742	N/A	10.78%
<i>Groundwater Recharge (GR)</i>				
High Polygon	77,436	N/A	0.61%	47.40%
Moderate Polygon	15,420	N/A	0.12%	9.44%
High Linear	N/A	24,517,052	N/A	24.82%
Moderate Linear	N/A	17,784,616	N/A	18.00%
<i>Nutrient Transformation (NT)</i>				
High Polygon	50,171	N/A	0.40%	30.71%
Moderate Polygon	56,640	N/A	0.45%	34.67%
<i>Carbon Sequestration (CAR)</i>				
High Polygon	93,483	N/A	0.74%	57.23%
Moderate Polygon	10,498	N/A	0.08%	6.43%
<i>Sediment and other Particulate Retention (SR)</i>				
High Polygon	30,344	N/A	0.24%	18.58%
Moderate Polygon	48,246	N/A	0.38%	29.53%
<i>Bank and Shoreline Stabilization (BSS)</i>				
High Polygon	20,802	N/A	0.16%	12.73%
Moderate Polygon	16,562	N/A	0.13%	10.14%
<i>Fish Habitat (FH)</i>				
High Polygon	11,200	N/A	0.09%	6.86%
Moderate Polygon	13,726	N/A	0.11%	8.40%
High Linear	N/A	9,796,114	N/A	9.92%
Moderate Linear	N/A	10,023,515	N/A	10.15%
<i>Aquatic Invertebrate Habitat (AIH)</i>				
High Polygon	12,564	N/A	0.10%	7.69%
Moderate Polygon	15,770	N/A	0.12%	9.65%
High Linear	N/A	20,590,767	N/A	20.84%
Moderate Linear	N/A	9,613,701	N/A	9.73%
<i>Waterfowl and Waterbird Habitat (WBird)</i>				
High Polygon	26,947	N/A	0.21%	16.50%
Moderate Polygon	17,218	N/A	0.14%	10.54%
Sandhill Cranes	3,407	N/A	0.03%	2.09%
<i>Other Wildlife Habitat (OWH)</i>				
High Polygon	117,191	N/A	0.93%	71.74%
Moderate Polygon	31,309	N/A	0.25%	19.17%
<i>Unique, Uncommon or Highly Diverse Wetlands</i>				
Spring Fed Wetlands	3,609	N/A	0.03%	2.21%

**Table 3. Wetland Functional Assessment Summary**

- Serving as transitional areas between wetlands and adjacent uplands, riparian areas provide critical habitat for both resident and migratory wildlife. These areas are also important in maintaining wildlife corridors, especially in the western

United States where the climate may be semi-arid or arid. For the project area, a total of 10,567 acres of riparian areas were mapped and classified.

- The mapping project will help determine a strategy for assigning assessment units to wetlands for wetland water quality standards.
- Map books and mapping information have been shared with watershed groups and non-profits that used the products for development and/or update of Wetlands Action Plans and also for the identification of high value “Wetland Gems.”
- 10 sites were selected for producing and distributing the interactive PDF mapping products (Map Books)(Figure 6). These areas include Angel Fire, Eagle Nest, Hwy 19 Canadian River Crossing, Maxwell Wildlife Refuge, Pecos, Raton, Rio Fernando de Taos, Upper Red River, Ute Park, and the Village of Mora.

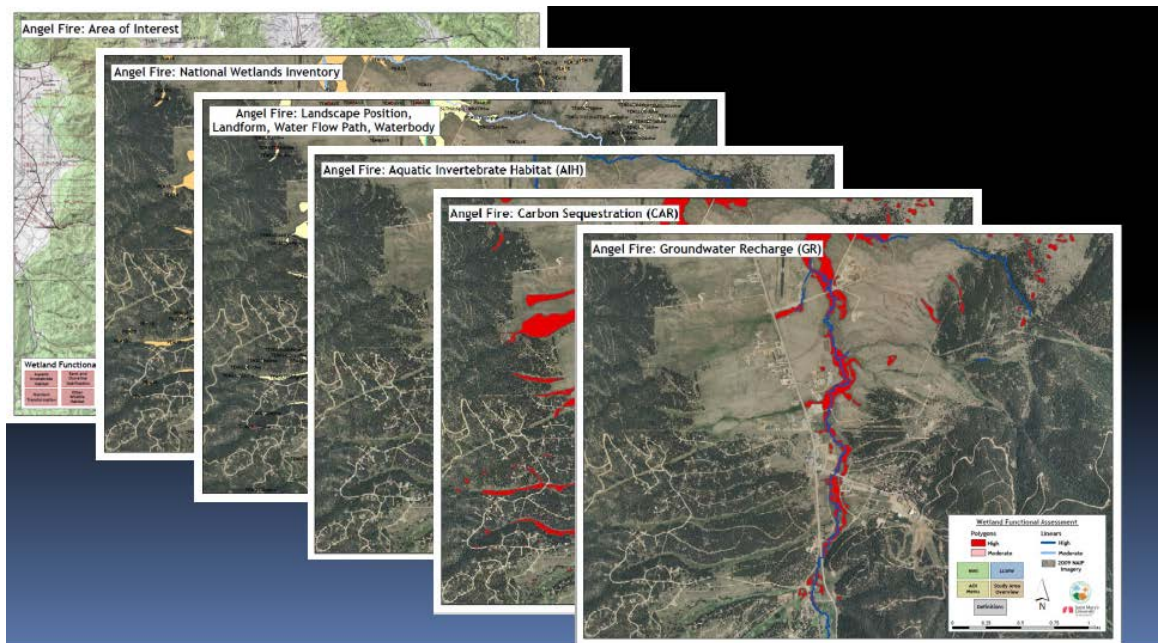


Figure 6. A selection of pages from the Map Book for the Angel Fire area.

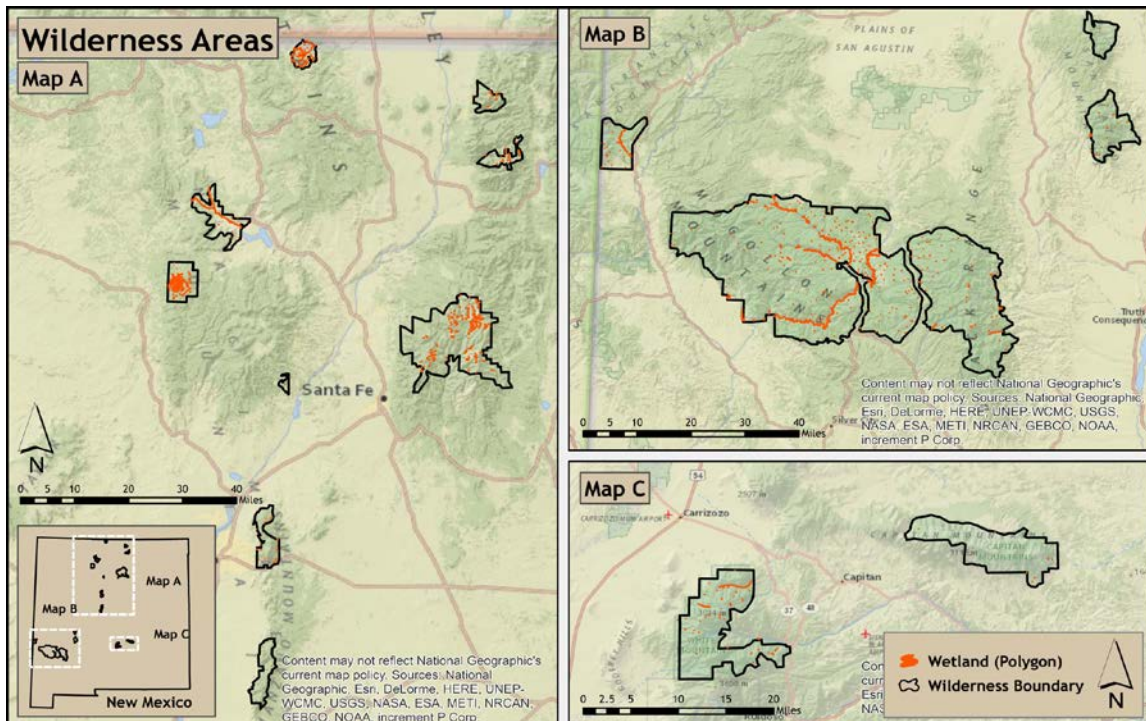
- The mapping products have been used by federal agencies for the National Forest Plan Revisions, and for locating wetlands for mitigation purposes.

### Project Location and Previous History

This project maps and classifies wetlands in a 19,755 square mile area. The northern boundary runs from a point near the northwest corner of Taos County along the Colorado/New Mexico Border east to the eastern edge of the state. The study area extends south to the southeast corner of Union County and then returns west through Conchas Reservoir through San Miguel County to the town of Pecos and then loosely follows Highway 64 north to the town of Costilla. Wetlands are located within selected orthoquarter quadrangles (DOQQs) of Colfax, Mora, Rio Arriba, San Miguel, Union, Harding and Taos counties in northeastern New Mexico (See cover photo). Wetland

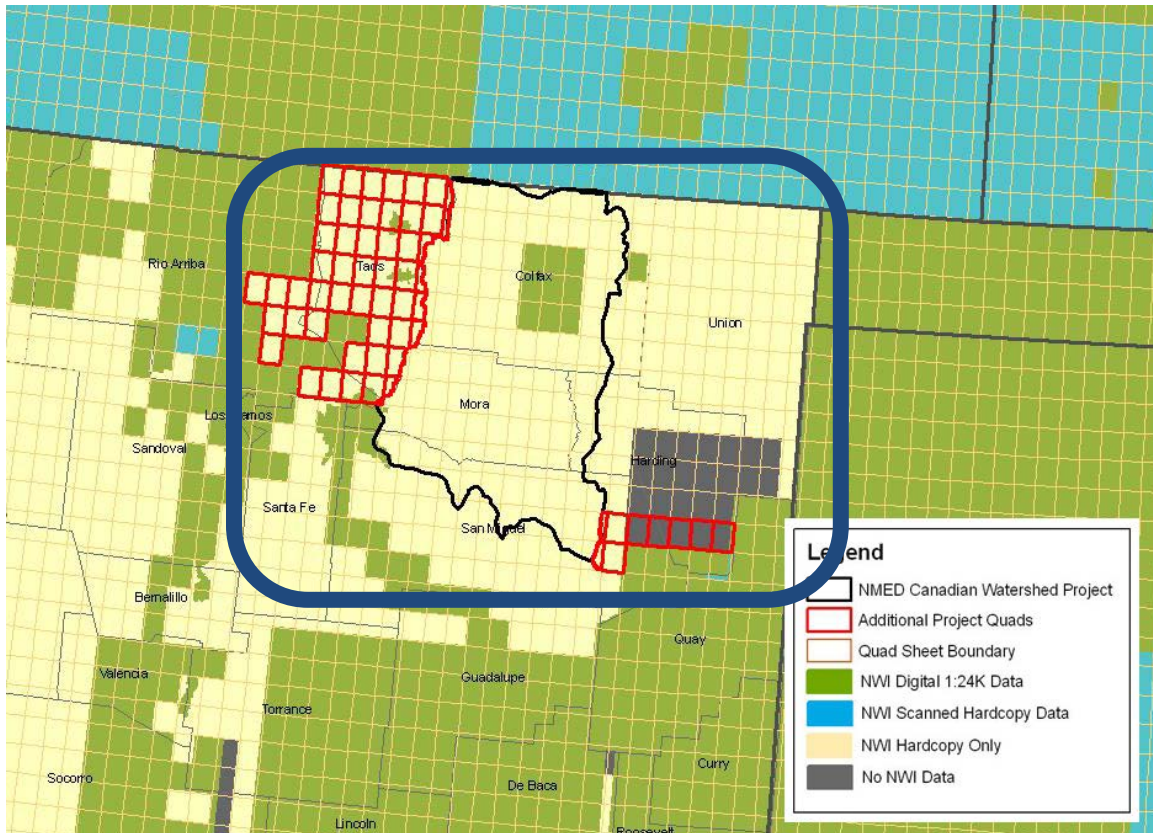


functions were also assigned to previously mapped Outstanding National Resource Waters (ONRW) within the following USFS Wilderness Areas: Pecos, Cruces Basin, Latir Peak, Wheeler Peak, Chama River Canyon, San Pedro Parks, Dome, Sandia, Manzano, Apache Kid, Captain, Blue Range, Withington, Gila, Aldo Leopold, and White Mountain (Figure 7).



**Figure 7. Map of USFS Wilderness Areas for which LLWW, HGM and functions of ONRW wetlands were mapped for this project.**

This is the first mapping effort of the SWQB Wetlands Program. All states in the southwest are lacking adequate mapping and assessment of wetlands and this project provides an arid-land landscape model for the use of LLWW and functional correlation and assignment and HGM subclass assignment. Northeastern New Mexico was chosen as our first mapping project because wetland mapping is incomplete and in some areas non-existent. National Wetlands Inventory (NWI) digital vector data was not available for the project area, and 1:100,000-scale scanned (not-geo-referenced) NWI maps exist for some areas but are 1980's era data. The 1:100,000-scaled maps are high altitude black and white images and lack adequate detail and quality of data to digitize existing 1980's maps (Figure 8).



**Figure 8. Limited mapping coverage in the project area. No previous mapping coverage in the project area met the Federal Geographic Data Committee National Wetland Mapping Standard of 1:12K.**

As SWQB Wetlands Program continues program development, the need for wetland mapping and classification of wetlands became more and more of a necessity as opportunities to restore and protect wetlands were hindered or lost by the lack of comprehensive mapping, preliminary assessment and appropriate classification of wetlands that meet the State's needs. In addition, a number of human activities have gained momentum that could potentially irreversibly affect wetland resources if the State is not prepared to protect these resources. For example as the needs of the nation dictate the production of more energy at home, renewed exploration for fossil fuels is expected in New Mexico, the third leading gas producing state (and specifically in the Raton Basin of northeastern New Mexico listed as one of the Nation's leading gas plays). In addition, population estimates are expected to rise as the quality of life in New Mexico becomes recognized by the nation. Virtually all of the eastern side of the Sangre de Cristo Mountains in New Mexico is either private or State owned and no wetland mapping or assessment was available.

In response to this deficiency and as part of the SWQB's current efforts to improve water quality and environmental conditions, New Mexico is conducting a rapid assessment (NMRAM) of its wetlands in order to assess and monitor its wetland resources. The maps of wetlands resources produced by this project became necessity to continue to develop our monitoring program, to comply with CWA Section 305(b) reporting, to



implement our 10-year Wetlands Monitoring Strategy and to implement restoration, monitoring, and protection objectives in New Mexico.

### **Original Timeframe**

The grant award for this project was approved July 10, 2010, and was to be completed by December of 2013. The grant award was amended for a no cost extension to October 2014 to run wetland functional assessment models, to test and apply to the final wetlands data, and to undergo QA/QC review. An initial crosswalk from NWI/LLWW to HGM subclasses was developed using the US Army Corps of Engineers HGM Regional Subclass for New Mexico and this was not adequate for NMED's needs. A no-cost extension was requested on April 8, 2014 to extend the Grant Award term through December 2015 so that the HGM cross-walk could be completed using a list of HGM subclasses developed by the Wetlands Program. A final emergency no-cost extension was requested to extend the term to April 2016, because of financial staff changes that lead to contract issues. A final small purchase agreement was put into place to finish out the expired contract with GSS and to run the Valley Confinement Tool to identify wetlands in confined valleys. The stated goals and objectives of the project remained the same, as well as the key project Tasks.

### **Partners Involved**

Successful and valued partnerships were forged with our principal partners including:

Jim Dick, US FWS Regional Wetland Coordinator helped with Contractor selection, Quality Assurance, and inclusion of wetland mapping data produced by this project in the National Wetlands Inventory (NWI). Jim Dick provided Cowardin mapping in the Gallinas watershed to which this project applied the LLWW, functional correlation and HGM subclass descriptions.

Andrew Robertson, John Anderson, David Rokus, Kevin Stark (Saint Mary's University of Minnesota, Geospatial Services (GSS), the principal contractor for the project provided guidance and expertise for the Wetlands Program first mapping project, in addition to over \$97,000 in contractor match. Mad Scientists Andrew Robertson and John Anderson also provided hours of amusing stories and mapping anecdotes as well as tremendous organizational and field mapping skills to make visits to over 500 ground-truthing sites possible within a short timeframe.

Zach Stauber (NMED GIS Coordinator) helped with Contractor selection, provided collateral data sets to the contractor, and provided guidance to help place these map products on the NMED Mapper.

Elizabeth Zeiler (NMED GIS Analyst) helped review map products, develop a consolidated database of each map layer and provided guidance for uploading the database on the NMED mapper and wetlands website.

Ralph Tiner (USFWS NWI), author of LLWW, helped apply the LLWW mapping classification, ground truth its application in New Mexico and tailored LLWW to arid region wetlands. He also participated in many on-line meetings and on the Project Advisory Committee.

Karen Menetrey and Emile Sawyer, NMED Wetlands Program Project Officers assigned to other projects, helped immensely with Go-To Meetings input, outreach tasks and map verification.

Richard Prather and Arlene Gaines, EPA Region 6 Wetlands and Water Quality Protection Division, provided guidance and review of project reports and project amendments as well as mapping product review and on-the-ground map book verification.

**Project Advisory Committee Members** – In addition to Wetlands Program Staff Maryann McGraw (WPC), Shelly Barnes (Wetlands Program PO), a Project Advisory Committee provided hours of their time to attend Advisory Committee meetings and a field review of LLWW mapping and functional correlation. The Project Advisory Committee included Jim Dick (US FWS Regional Wetland Coordinator), Leann Wilkins, Maxwell National Wildlife Refuge Manager (USFWS), Philip Garcia, Refuge Biologist, Las Vegas National Wildlife Refuge Complex (USFWS), Gus Holm, Asst. General Manger, Vermejo Park Ranch, James Bearzi, Gila River Ecologist, NM Office of the State Engineer, Richard Prather, Technical Advisor, EPA Region 6, Esteban Muldavin, University of New Mexico Natural Heritage Program, Ralph Tiner, author of LLWW (USFWS NWI), Chris Cudia (NMED), and Deby Sarabia (NMED). Andrew Robertson and John Anderson (GSS) conducted portions of the meetings.

**Wetlands Action Plan Contacts** – This project was presented to watershed groups in the project area and mapping products were provided to groups working on Wetlands Action Plans. Key contacts for this effort included:

Lea Knutson – Hermit’s Peak Watershed Alliance for the Upper Gallinas Watershed.

Doug Jeffords – Upper Pecos Watershed Association for the Upper Pecos Watershed

Mollie Walton - Quivira Coalition for the Comanche Creek Watershed

Rick Smith, Gus Holm, Joann Hilton – Cimarron Watershed Alliance for Moreno Valley Watershed.

**Wetland Gems** – Rachel Conn of Amigos Bravos (local NGO) used the map products and also contracted with GSS for the selection of “Wetland Gems” in the Carson National Forest. Wetland Gems are wetlands with important functions that Amigos Bravos is requesting the USFS manages as special management areas. Their time and non- federal support for this effort was also included as match for this project. The Wetland Gems Project can be found on the Amigos Bravos website at <http://amigosbravos.org/spotlight/view/44>.

## Funding

The original Federal amount was **\$386,847.00** and the original match amount was **\$135,121.00**. The final federal amount spent was **\$378,605.13** and **\$135,173.92** was the final match amount. See semi-annual reports for details.

## Project Highlights and Chronology

- This project was approved and funded by EPA on July 10, 2010.
- The Wetlands Program Coordinator initiated the RFP process to hire a contractor to help implement Tasks 2 through 12 and 15 of this project.
- A literature search was started by Wetlands Program volunteer, Jason Gabel.
- Of five proposals submitted in response to the RFP, St. Mary's University of Minnesota Geospatial Services (GSS) was selected and a contract was completed on September 30, 2011.
- The WPC attended a weekend Private Land Wildlife Corridors workshop at the Pritzlaff Ranch near Sapello, New Mexico which is located within the project area. The WPC introduced the Canadian Mapping project to stakeholders, and found contacts for ground-truthing wetlands as part of the mapping field review.
- An introductory meeting for stakeholders and the development of a Project Advisory Committee was conducted on October 17, 2011.
- A pre-mapping field review of 161 wetland sites was conducted October 17 through October 20, 2011 to correlate image signatures to ground conditions. A pre-mapping field review report was produced (Figure 9).
- The Project Quality Assurance Project Plan (PQAPP) was completed and approved by EPA on November 29, 2011.



Figure 9. October 2011 field visit, Site 88, NM Highway 38 approximately 4 miles north of Guadalupita, NM (Photo, SMUMN GSS).

- Shelly Barnes was hired as a Wetlands Program Project Officer and was assigned to be the Project Officer for this project in December 2011. Shelly Barnes is 50% State-Funded in order to provide match to Wetlands Program Development Grants.
- Shelly Barnes has assumed the role of NM Wetlands Mapping Consortium Coordinator. Shelly has made several contacts and has attended Geospatial Advisory Committee meetings to engage other GIS professionals in the development and acquisition of wetland mapping information for New Mexico.
- Shelly is also coordinating with the U.S. Forest Service to collect wetland and riparian mapping data from USFS projects to use as collateral data with the ongoing mapping efforts.
- Shelly Barnes and Chris Cudia presented information about the project and the Wetlands Mapping Consortium to the Cimarron Watershed Alliance on January 25, 2012 in Cimarron, New Mexico.
- In February, 2012, this Mapping Project and the Wetlands Mapping Consortium were presented at the Agency Wetlands Roundtable and at the NGO Wetlands Roundtable.
- The PQAPP was updated to include the additional geographic area and the linear wetland features and was approved on April 24, 2012.
- The contract and project workplan between NMED and GSS was amended (#1) on May 2, 2012, to expand the geographic area to include approximately 50 quads in the Upper Rio Grande, Rio Arriba and Upper Pecos watersheds as well as additional quads in Harding County to the southeast of the Conchas Reservoir.
- The color infrared imagery emulsion of the 2009 NAIP imagery would provide additional wetland mapping information that was not interpretable from the true color product that GSS was using. GSS undertook the georeferencing of this imagery for the project area so that it could be used. They completed this work as an in-kind contribution to the federal match requirement in May, 2012.
- A preliminary list of wetland functions was developed by the WPC. GSS, Wetlands Program Staff and Ralph Tiner (author of LLWW) USFWS, reviewed these functions in relation to the wetland classes and landscape positions to develop a relevant metric for LLWW classification of NM wetlands. Ralph Tiner provided a draft correlation table of wetland types to wetland functions for a starting point of classification for wetlands in New Mexico.
- A preliminary meeting for developing metrics for the LLWW classification system was convened via Go-To-Meeting on May 7, 2012 with Wetlands Program staff, GSS, the NWI Regional Coordinator, and Ralph Tiner, USFWS.
- A first draft map review meeting was held with the Wetlands Program staff, NMED SWQB staff, and the NWI Regional Coordinator on May 23, 2012.
- An Intergovernmental Agreement with the US Fish & Wildlife Service was completed on May 31, 2012 to assist NMED by providing technical guidance on image acquisition, classification schemes, application of the LLWW classification to wetlands of the arid west, and Quality Assurance of mapping products for compliance with FGDC standards and inclusion in the National Wetlands Inventory.

- A Project Advisory Committee was assembled and a project introductory meeting was held via WebEx on June 4, 2012. A formal presentation by the Wetlands Program and GSS to the steering committee regarding the mapping to date and the process to develop LLWW classification coding was held at Highlands University in Las Vegas, NM on June 18, 2012.
- A second pre-mapping field review was conducted June 16-17 and June 20-23 in northeastern New Mexico to review the expanded geographical area of the project in the Upper Rio Grande in Rio Arriba County, Upper Pecos in San Miguel County, and the additional quads in Harding southeast of the Conchas Reservoir. 119 check sites were visited (Figure 10) and a field review report was produced.



**Figure 10. Soils were checked for hydric and redoximorphic features at a site south of Ocate, NM. (Photo, SMUMN GSS)**

- A draft map field review was conducted on June 18 – 19, 2012. Sixty-four (64) check sites were pre-selected based on questions from the review of the first completed map products and by the GSS Photo Interpreter, John Anderson. A Field Trip Summary Report for Review of Draft Map Data was developed.
- Shelly Barnes attended Applied Fluvial Geomorphology Training (Rosgen Level 1) near Missoula, MT, the week of June 25 – 29, 2012 under this grant.
- The original RFP and contract for this project did not include linear wetland features as a mapping unit. Linear wetlands in confined valleys are one of the HGM subclasses for which NMRAM will be developed. A Request for Quotes for the linear feature wetland mapping of the entire project area was distributed and GSS's quote was selected. The Contract was approved on July 1, 2012.



- As part of the Wetlands Mapping Consortium Task, Wetlands Program staff met with the NRCS to discuss partnering in mapping and field verification of hydric soil and wetland subclasses, and with the US Army Corps of Engineers regarding the Planning Assistance to States Program as a funding opportunity to continue mapping wetlands in New Mexico.
- A Landscape Level Functional Assessment meeting was held by the Project Advisory Committee from Oct.1 – 3, 2012, to determine which functions would be assigned to wetlands and to develop a draft LLWW functional correlation table. The list of functions selected by the Committee and interpretable from the mapping products is shown in Table 1. Results from the wetland functional assessment indicated that Groundwater Recharge, Waterfowl and Water Bird Habitat, and Other Wildlife Habitat were the most commonly occurring wetland functions in the project area and were performed by most wetlands. The least common function performed was the Unique, Uncommon, or Highly Diverse Wetland Plant Communities Function.
- The mapping product was discussed at the October 30, 2012 Wetlands Roundtable as an opportunity for Wetland Action Plan development by communities and Watershed groups as a means of increasing awareness of the value of this resource.
- Draft mapping product was provided to the Upper Pecos Watershed Association for assistance in development of a Wetlands Action Plan.
- WPO Shelly Barnes gave a presentation by Webinar to the Wetland Mapping Consortium break out session at the Annual Association of State Wetland Managers national conference on March 5, 2013 (Figure 11).

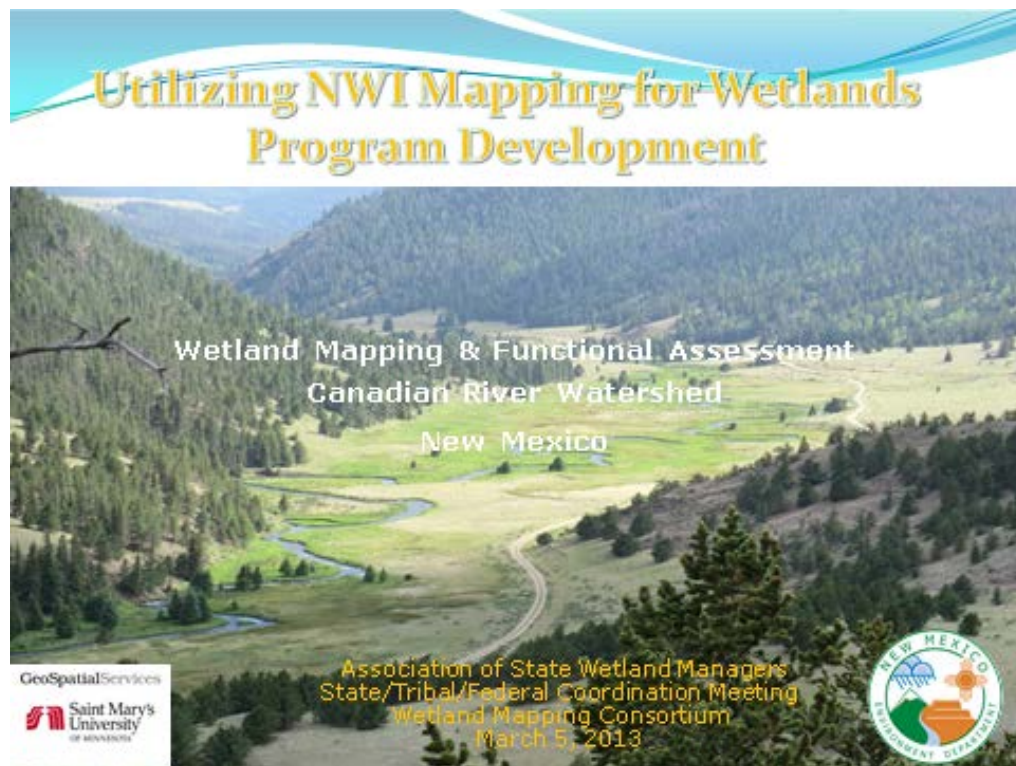


Figure 11. ASWM Presentation made by Shelly Barnes.

- An overview of this project was presented to the NMED Jemez Mountain Wetland Mapping Project Steering Committee on 5/20/13 in Santa Fe, NM.
- The GSS contract was amended (#2) to include a two-day field validation of the functional assessment model based on the NWI and LLWW classification coding schema and extend the contract date through September 2013. The field validation was to ensure that wetlands have been correctly assigned to categories of ecological function and/or, if necessary, adjust the mapping process to more accurately reflect actual ground conditions. The field validation was completed on May 23 and 24, 2013.
- The geodatabase and Cowardin (NWI) and LLWW (NWI+) classification, including linear wetlands was completed by July, 2013. The wetland functional assessment models (SQL queries using ArcGIS model builder) were built, tested and applied to the final wetlands data and were undergoing QA/QC review. An initial crosswalk from NWI/LLWW to HGM subclasses was developed using the US Army Corps of Engineers HGM Regional Subclass for New Mexico and will be applied in a test scenario prior to the end of August, 2013.
- Based on the preliminary functional assessment data, it was determined that a field validation of the model would be beneficial to the project. The contract with St. Mary's University of Minnesota, Geospatial Services, was amended to include a two-day field validation of the functional assessment to ensure that wetlands have been correctly assigned to categories of ecological function and/or, if necessary, adjust the mapping process to more accurately reflect actual ground conditions. The field validation was completed on May 23 and 24, 2013.
- NMED SWQB Wetlands staff worked with the Hermit's Peak Watershed Alliance (HPWA) to develop a Wetlands Action Plan for the Upper Gallinas watershed. During discussions with HPWA it was realized that much of this watershed was just outside the boundaries of this mapping project. NMED asked Jim Dick, USFWS, for assistance in mapping 27 quadrangles adjacent to the project area for technical assistance to this group. Jim Dick supplied the NWI information to HPWA in July 2013.
- The contract with GSS was amended (#3) to include two additional sub-watersheds, 96 quads in the Dry Cimarron Watershed in Colfax County, and to complete LLWW and HGM classification of the 27 quads of the Upper Gallinas Watershed, and to extend the contract until September 30, 2014.
- The original project area geodatabase was finalized and forwarded to the USFWS for final QA/QC and to add to the National NWI database and mapper.
- The initial crosswalk from the NWI & LLWW classification to HGM subclass categories based upon "USACE HGM Regional Subclass for New Mexico" provided by WPO Shelly Barnes to GSS did not provide the category divisions suitable for NMED Wetlands Program purposes. The WPO then developed information to be utilized in the GIS setting to detail query information for the following categories:
  - Riverine
    - Mid-montane unconfined riverine
    - Confined / canyon riverine
    - Lowland riverine

- Sub-alpine/alpine riverine
- Slope Wetlands
  - Springs/Seeps (limited to collateral data information as this type is usually too small to be captured via landscape level mapping processes)
  - Headwater outflow
  - Other (tbd)
- Lacustrine fringe
- Depressional
  - Playas
  - Other (tbd based on mapping information)
- Flats (tbd based upon information available from landscape level mapping process)

- Adding the Dry Cimarron watershed to the project area required an additional pre-mapping field review of this area in the northeastern corner of New Mexico. This additional pre-mapping field review was performed in conjunction with a draft map review the week of October 21 – 24, 2013. The field trip summary was developed.
- GSS included an overview of this project in a presentation to the Watershed Planning Stakeholder Committee in Douglas County, Wisconsin on October 30, 2013.
- WPO, Shelly Barnes, presented an overview of the project, the classification systems, and functional assessment to participants of the NGO and Agency Wetland Roundtables hosted by the NMED Wetlands Program on October 15 and 28, 2013.
- WPO attended the New Mexico Floodplain Managers conference in Hobbs, NM October 16 – 18 as a guest speaker. A one-hour overview of the project, classification systems, and landscape level functional assessment were presented to the member attendees.
- On October 23, 2013, WPO presented the project products and described ideas for utilizing the information to members of the Cimarron Watershed Alliance in Cimarron, NM. The watershed group members have requested copies of the geodatabase and a follow up presentation to assist in training the members on how to decipher the classification codes and utilize the landscape level functional assessment information for future planning efforts.
- On October 29, 2013, WPO presented the project products and discussed utilization of the information with Rachel Conn of Amigos Bravos in Taos, NM. Amigos Bravos has requested a future meeting to discuss how best to utilize the information for US Forest Plan Revision discussions and future watershed planning projects in northern New Mexico.
- WPO attended the EPA Wetlands Tribal workshop in Albuquerque, NM, as a guest speaker and provided an overview of the project, classification systems, and landscape level functional assessment. The presentation included detailed information on the LLWW classification system and the wetland information that this hydro-geomorphic based system provides.

- On December 13, 2013, WPO presented an overview of the project products to the New Mexico Geospatial Advisory Committee (GAC).
- GSS presented an overview of this project in a webinar to the Association of State Wetland Managers Wetland Mapping Consortium on January 15, 2014.
- WPO presented remotely to the Wetland Mapping Consortium breakout session of the Association of State Wetland Managers Annual Meeting on March 5, 2014. The presentation was titled “Utilizing NWI Mapping for Wetlands Program Development.”
- WPO provided the Canadian River Riparian Restoration group (CR3) with information regarding the mapping project, products, and status, as well as an overview of NWI and LLWW classification systems and the landscape level functional assessment on March 10, 2014 near Mosquero, NM. Samples of the mapping products available were created by GSS and provided to the group. CR3 is working to develop a proposal for a CWA 319 grant and are interested in utilizing the mapping information for inclusion in a Watershed Based Plan.
- A no-cost extension was requested on April 8, 2014 to extend the Grant Award term through December 2015. This extension was approved by the EPA.
- The original ~186 USGS quadrangles of the project area was approved by the US FWS and included in the National NWI database and the NWI mapper online.
- A change to the classification convention for the LLWW portion of the project was suggested by Ralph Tiner, USFWS. This edit will allow for a more accurate representation of the wetland functional assessment in the arid west.
- On May 6, 2014, WPO met with Rachel Conn of Amigos Bravos regarding utilization of the wetland GIS database. Amigos Bravos is interested in locating sensitive wetland areas in the Carson National Forest for special status inclusion in the Forest Service Revision Plan. Amigos Bravos contracted directly with GSS to utilize this GIS database to develop priority areas and map products for suggestions in the upcoming Carson National Forest Revision Plan. The contract and Amigos Bravos time is included as match for this project.
- WPO attended a USACE Streams and Riparian Areas for Water Quality Workshop conducted by the USACE Water Operations Technical Support (WOTS) Team May 13 – 15, 2014, in Albuquerque, NM.
- Interactive maps in PDF format were proposed to be developed in place of the paper maps to create a more user friendly interface of the database information. Including the functional assessment portion of the project, there is a total of 13 separate maps that could be developed for each site selected. The original contractual requirement of 200 paper maps would realistically cover 15 specific sites. The PDF map products could layer all 13 maps in one file and allow for ease of access to a larger mapping area than can be accomplished with paper maps. This change in the project’s products reflects the demand for more electronic products that are still user friendly instead of static paper maps.
- GSS contract amendment (#4) was approved in August, 2014, to edit the LLWW classification codes to more accurately reflect conditions in the Arid West and to include the change in mapping conventions regarding the (IS) Isolated classification schema. This edit was suggested by Ralph Tiner of the USFWS after reviewing the initial completed LLWW data for the mapping area. The

amendment also included the addition of LLWW classification to existing NWI mapping of 5 USGS Quads along the main stem of the Pecos River, and all USFS Wilderness Areas Quads in New Mexico.

- A GSS contract amendment (#5) was approved in December, 2014 to extend the GSS contract date through August 31, 2015.
- 10 sites were selected for producing and distributing the interactive PDF mapping product. These areas include Angel Fire, Eagle Nest, Hwy 19 Canadian River Crossing, Maxwell Wildlife Refuge, Pecos, Raton, Rio Fernando de Taos, Upper Red River, Ute Park, and the Village of Mora.
- WPO attended a Native Plant Society workshop on Grass Identification September 4 – 6, 2014 at Sevilleta National Wildlife Refuge Field Station under this grant.
- WPO presented information regarding the inventory and classification and the landscape level functional assessment to over 200 attendees at a one-day Wetland Workshop in conjunction with the Quivira Coalition Annual Conference in November, 2014.
- Shelly Barnes, WPO for this project, has resigned from this position April 24, 2015, and Maryann McGraw, Wetlands Program Officer has taken over completion of this project.
- A literature search identified the Valley Confinement Tool (Model) for correctly mapping confined and unconfined valley HGM Subclasses across the project area, after one attempt did not map these subclasses accurately.
- The entire project area mapping was complete by July, 2015. The classifications and final internal quality control was still pending. The final QC for the NWI was forwarded to Jim Dick and for the LLWW to Ralph Tiner of the USFWS.
- GSS submitted a draft final report to NMED for review by WPC and IT personnel in July, 2015.
- The WPC began discussions with NMED IT GIS staff for hosting these map data on the NMED server and having it available to the public.
- The WPC also conferred with Virginia Tech and ASWM for hosting the map products and data on their servers for use by the public, but the appropriate funding mechanism was not available.
- The Carson National Forest (CNF) requested the mapping products to use for their Forest Plan Revision. The WPC arranged for a direct transfer of the maps and metadata from GSS to the CNF.
- The Army Corps of Engineers requested access to the LLWW and the functional classification for 404 permitting and mitigation purposes. The WPC is looking into NMED hosting the map products so that the Corps and others can have access from our website (and the limitations of the data will be included in the explanation for using it for regulatory purposes).
- A remaining subtask to complete the HGM classification for confined and unconfined riverine wetlands for the entire mapped area is pending since the initial classification did not successfully identify confined wetlands. Other wetland types in the project have had the HGM classification successfully applied. The Valley Confinement Tool application is expected to help complete this subtask.



- Karen Menetrey gave a presentation on September 23, 2015 to approximately 22 people of the Cimarron Watershed Alliance about the NE NM Wetlands Mapping and Classification project with a focus on the Moreno Valley in Colfax County, NM. The project geodatabase and the PDF maps for Angel Fire and Eagle Nest are being used in the development of the Moreno Valley Wetland Action Plan under CD #00F425-01-0A.
- The Wetlands Program created a two-sided color fact sheet that describes the mapping and classification project. Two hundred copies of the fact sheet were printed and distributed at various future events.
- Maryann McGraw and Arlene Gaines conducted a field-based review of the map book products on September 24, 2015. They visited the Red River, Angel Fire, and Eagle Nest project areas and verified maps with on-the-ground conditions. The field observations from this review were discussed with GSS, and where possible, mapping revisions were made in the final map products.
- Karen Menetrey, Wetlands program Project Officer, gave a presentation on October 6, 2015 to approximately 10 people at the Comanche Creek Working Group meeting focusing on the wetland functions for Comanche Creek Watershed. The Comanche Creek Working Group is producing a Wetlands Action Plan.
- Gary King (SWQB Web developer) and Julie Roybal (NMED Administrator) gave a hands-on presentation to Pecos Middle School students about New Mexico Wetlands and Watersheds. Gary King provided the presentation and game and Julie helped with the students. 50 school children and one teacher attended the 1 and 1/2 hour session.
- An emergency no-cost amendment was approved by EPA on October 14, 2015, to extend the grant to April 30, 2016. Resignations and changes in financial staff at NMED were causing severe delays in project completion.
- The WPC and Andy Robertson (GSS contractor) teamed up to present this project as a webinar to ASWM Wetland Mapping Consortium on October 21, 2015. The presentation, “ From Fen to Floodplain: Steps in a Successful Landscape Level Wetland Inventory in Northeastern New Mexico” was well received.
- The WPC authorized the purchase of two ruggedized tablets for taking mapping products in the field for checking, verification and using the maps for other projects.
- Amigos Bravos used the map products for the selection of “Wetland Gems” in the Carson National Forest and in mapped parts of the Santa Fe National Forest. Wetland Gems are wetlands with important functions that Amigos Bravos is requesting the USFS manages as special management areas.
- Emile Sawyer was hired as a Wetlands Program Project Officer and attended the New Mexico Geospatial Advisory Committee meeting under this Project on November 10, 2015.
- SWQB staff displayed project information at an exhibitor table at the Quivira Conference on November 11-13, 2015 in Albuquerque, NM (Figure 12). Karen Menetrey, Emile Sawyer, Greg Kaufman and Meg Hennessey received visitors at the exhibitor table throughout the conference breaks and lunch periods.

Collectively, staff spoke to 73 people about the project for an average of 10 minutes each.

- Karen Menetrey gave a presentation on wetlands mapping and classification and its benefits on November 17, 2015 to approximately 16 attendees at the US Forest Service/NMED Annual Coordination meeting. The audience included staff from all the National Forests in New Mexico as well as staff from NMED.



**Figure 12. NE NM Mapping and Classification project display board at the Quivira Coalition Conference, November 2015.**

- Under this grant, Emile Sawyer, new Wetlands Program Project Officer replacing Shelly Barnes, attended the Committee on Irrigation and Drainage Conference in November 2015, where he was a co-author on a presented paper. Emile networked with drainage engineers and irrigation districts to let them know about wetland issues and about his new position with the SWQB Wetlands Program.
- The WPC conducted meetings with NMED IT GIS staff on November 24, 2015 for hosting these map data on the NMED server and having it available to the public. At this time, the most logical host for these data is on the NMED Mapper.
- Maryann McGraw used the project display, map books and fliers as a poster session at the 7<sup>th</sup> Annual Northeastern New Mexico Prairie Partnership Meeting on December 2, 2015, in Tucumcari, New Mexico.
- A no-cost amendment was approved by EPA on February 16, 2016 to redistribute budget.
- A new contract for GSS to use the Valley Confinement Tool for Unconfined/Confined HGM subclass mapping was approved on January 11, 2016. The final methodology is focused on identifying confined and unconfined riverine locations for three ecoregions: Alpine/SubAlpine, Montane, and Plain by

- adapting a GIS-based modeling approach developed by the US Forest Service, called the Valley Confinement Algorithm. It effectively segments a target watershed into riverine and non-riverine landscapes using digital elevation model data, mean annual precipitation, accumulated flow and catchment boundaries. It also identifies which riverine landscapes are confined (i.e. little or no floodplain development) and which are unconfined. Once riverine extents have been defined, the process then uses a series of database queries to separate all wetlands into HGM subclasses based on their NWI and LLWW characteristics plus their location either within or outside of confined and unconfined valleys. In some cases decision criteria around subclass precedence need to be applied to ensure that wetlands that meet more than one hydrogeomorphic category (e.g. spring-fed sloped wetlands that fall within a floodplain environment) are assigned correctly.
- Assignment of HGM Regional Subclasses was also validated using traditional image interpretation techniques.
  - On March 2, 2016, Emile Sawyer and Karen Menetrey conducted a review of the draft Valley Confinement products in the Canadian Watershed. A conference call was conducted in March to present the results of this field review to GSS, and make adjustments.
  - On April 30, 2016, GSS provided the Wetlands Program the final deliverables and the final report for this project. The GSS Final Report is included with this Wetlands Program Final Report as it provides additional detail about the mapping effort.

### **List of Major Deliverables (on file at NMED)**

Contracts and Amendments

Project Advisory Committee Meeting Reports

Geodatabase

Relevant Literature

Quarterly Reports from GSS

Pre-Mapping and Draft Mapping Review Reports

Final Map products and metadata for Cowardin Classification, LLWW, Functions, and HGM

Ten Map Book PDFs and instructions for making additional map books

Semi-Annual Reports to EPA including photographs of project progress

Documentation of match

Final Report

### **Lessons Learned**

A key lesson learned was how important it is to have wetland mapping products for New Mexico and the variety of applications there are for these maps. Also, having a highly qualified contractor allowed us to get more mapping done than anticipated, create innovative maps products and use map products for innovative applications.

This was the SWQB Wetlands Program's first mapping project and a number of lessons will be applied to future mapping projects. One lesson was that it was difficult for the contractor to map HGM after the mapping was completed using queries, since there were

a number of places where the queries would overlap wetlands that would ultimately be assigned to different HGM subclasses. For example, the contractor used innovative techniques such as the Valley Confinement tool to overcome these mapping issues. In the future it may be more efficient to map the HGM classes simultaneously with the Cowardin and LLWW.

During the project period, newly developed technology was presented to us in the form of the interactive map books instead of paper maps for outreach. A lesson learned was to have the flexibility to incorporate new technology into the project. In this case the map books were more accessible to outside users, and can be updated or expanded easily.

Internally a lesson learned was to keep all the map products and the current geodatabases where all those working on the project had access. This was an issue when one of our staff left and all the geodatabases were stored on the person's drive.

### **What Made the Project Successful**

The project was successful in the quality of the products that were produced. Mapping coverage was three times the area anticipated when the project started. This was in part due to the efficiency and expertise of the mapping contractors.

Habitat (Cowardin) and hydrogeomorphic (LLWW) classifications were applied to all wetlands. The successfulness of the Cowardin Classification is that it is a classification that is applied nationwide, and we were able to include our mapping products on the NWI Mapper for national access.

Through the application of LLWW to this project and the involvement of Ralph Tiner, the author of LLWW, the LLWW was updated to apply to arid states.

All HGM subclasses were mapped in the project area. This is important for identifying the extent of the reference domain for each subclass and finding sites and correctly use the NMRAM for assessment on that subclass. Another important use of HGM classification is that it is easier to communicate with the public compared to the codes of Cowardin and LLWW.

These mapping products were used by Watershed Groups to better understand the wetland resources in their watershed and to prepare more comprehensive Wetlands Action Plans.

These products are being used in Forest Plan Revisions to better manage and protect wetland resources.

The Wetlands Program has a secured place on the NM Geospatial Advisory Committee to stay up-to-date on mapping initiatives, products and partnerships that can be useful to the Wetlands Program.

The variety of applications in all aspects of the Wetlands Program - monitoring, restoration, standards and regulations, made this project all the more successful. The project demonstrates successful and innovative tools that the SWQB Wetlands Program, agencies, tribes and the public - on the local level and on the national level, can use for a variety of applications.

### **What Made the Project Not So Successful**

The project was delayed in the end because it took more time than anticipated to complete the HGM classification, and because of Financial Staff turnover, it took longer than anticipated to get contracts in place.

### **Technical Transfer**

The Carson National Forest (CNF) requested the mapping products to use for their Forest Plan Revision. The WPC arranged for a direct transfer of the maps and metadata from GSS to the CNF.

The Army Corps of Engineers requested access to the LLWW and the Functional classification for 404 permitting and mitigation purposes. The WPC is looking into NMED hosting the map products so that the Corps and others can have access from our website (and the limitations of the data will be included in the explanation for using it for regulatory purposes).

The Santa Fe National Forest (SFNF) has also requested the mapping products from this project that overlap with SFNF lands. GSS has also transferred these maps and maps from the Jemez mapping project (CD #00F434-01-0A) for the SFNF to use in their forest plan revisions.

WPO Shelly Barnes gave a presentation by Webinar to the Wetland Mapping Consortium break out session at the Annual Association of State Wetland Managers national conference on March 20, 2013.

Maryann McGraw (WPC) and Andy Robertson (GSS contractor) teamed up to present this project as a webinar to ASWM Wetland Mapping Consortium on October 21, 2015.

The mapping project was presented at the Quivira Coalition Conference, at USFS/NMED annual meeting and at several Wetlands Roundtables hosted by the SWQB Wetlands Program.

Maryann has also been asked by the Association of Clean Water Administrators (ACWA) to prepare a webinar presentation regarding Wetland Narrative Standards. Part of that presentation will include the use of the mapping products for locating wetland types, mapping wetland functions for designated uses, and using the map products to determine assessment unit limits.

The Cowardin classified wetlands, and Riparian area mapping have been included in NWI and are available to the public.



SWQB GIS staff are including the map products on the NMED mapper.

Two ruggedized tablets were purchased for taking mapping products in the field for checking, verification and using the maps for other projects. The tablets were used by Emile and Maryann for field checking.

Amigos Bravos (local NGO) used the map products for the selection of “Wetland Gems” in the CNF and SFNF. Wetland Gems are wetlands with important functions that Amigos Bravos is requesting the USFS manages as special management areas.

### **EPA Feedback Loop**

*What would you suggest that EPA do differently to improve the process in regard to this project?*

EPA was very supportive in all aspects of this project during the project period, especially allowing grant period extensions to complete high quality and meaningful work. This project has allowed the wetlands program to advance in all areas especially in Northeastern New Mexico where most land area is in private ownership. These types of projects should continue to be wholeheartedly supported by EPA Region 6 Wetlands Program Development.

### **Future Activity Recommendations**

This project is also the model for four more current mapping projects funded by EPA Wetlands Program Development Grants including the Jemez Mountains and surrounding areas, the Sacramento Mountains area, the Middle Rio Grande (MRG) and mountain ranges east of MRG, and the Gila/San Antonio watersheds and surrounding areas in the southwest corner of New Mexico. Although it is a model, the SWQB Wetlands Program is trying to keep up to date with current technology innovations to make these future projects even more useful and successful. In addition, we intend to update and improve mapping for all lands in New Mexico under state jurisdiction.

Also there are many follow-up activities that can be developed using the mapping products in the area of wetland standards development, protecting rare or high quality wetlands identified from the map products, additional monitoring of wetland types, etc.

We also intend to continue with outreach and technical transfer activities to continue to make these map products useful for other applications and into the future.