CLEARING THE WATERS

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Project Spotlight

Mapping and Classification for Wetlands Protection

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The **Surface Water Quality Bureau Wetlands Program**, in cooperation with **Saint Mary's University of Minnesota Geospatial Services** (GSS) (contractor) and a Project Advisory Committee, have completed mapping and classification of wetland and riparian resources and deepwater habitats in northcentral and northeastern New Mexico, and in US Forest Service (USFS) Wilderness Areas throughout New Mexico (Figure 1).

As the Surface Water Quality Bureau (SWQB) Wetlands Program continues to expand its capacity, the need for wetland and riparian spatial data statewide, and classification of wetland types across the state, has become more important. Opportunities for wetland planning and to restore and protect wetlands are hindered or lost by the lack of comprehensive up-to-date mapping, preliminary assessment and appropriate classification of wetlands that meet the State's needs. All states in the southwest lack adequate mapping and classification of wetlands. As an example, in northeastern New Mexico, wetland mapping was incomplete and in some areas non-existent. Without wetland maps it was impossible to identify wetland resources spatially and quantify how much of each wetland type exists. Adequate maps of wetland and riparian resources are a necessity for SWQB to implement restoration, monitoring, and protection and to prioritize these objectives in New Mexico. High resolution up-to-date mapping and classification of wetlands and riparian areas allow us to more efficiently assess wetland and riparian resources in any given area.

NMED Surface Water Quality Bureau
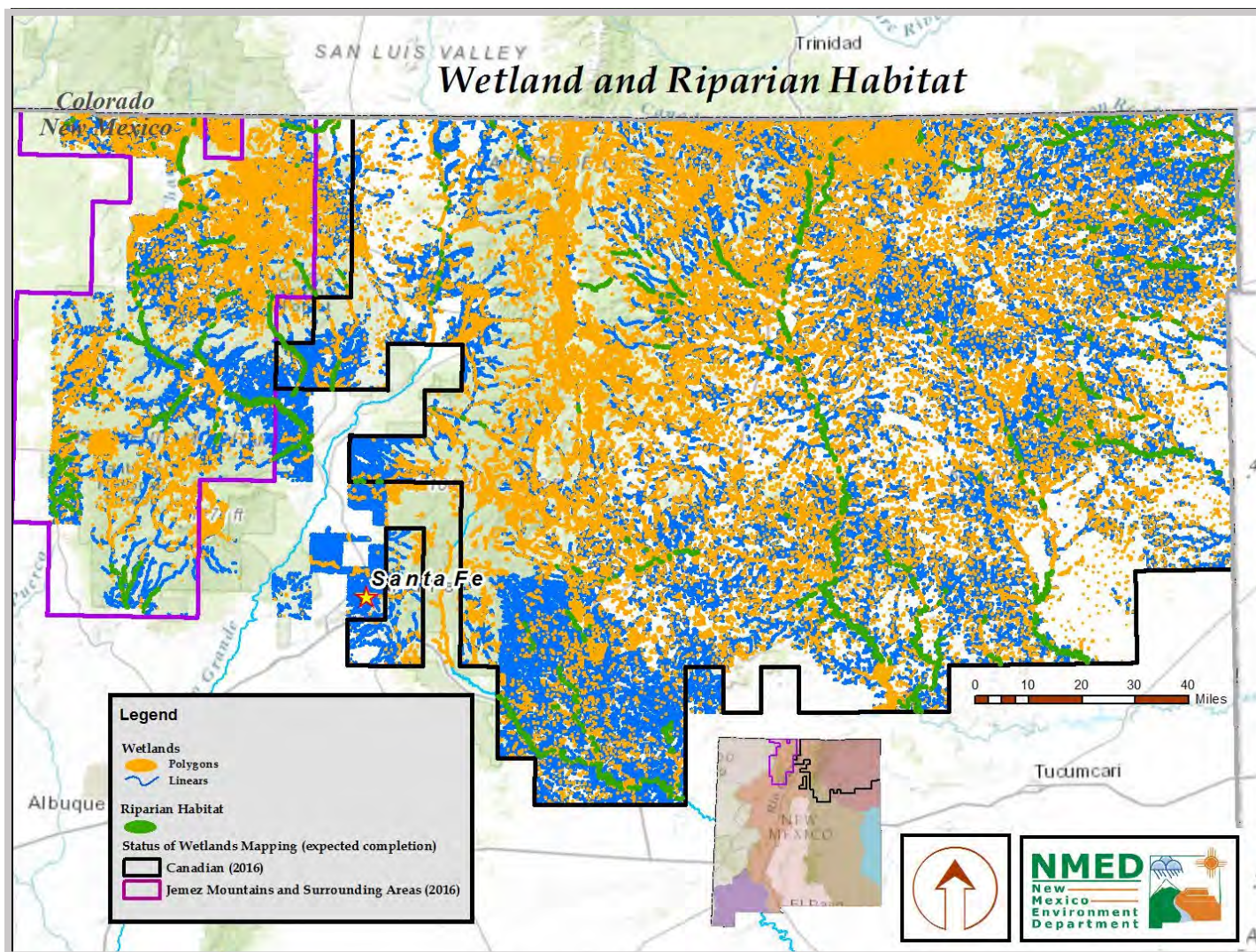www.env.nm.gov/swqb/

Figure 1. Cowardin Classification map of wetlands and riparian areas and deepwater habitats in northeastern New Mexico produced by this project (Liz Zeiler 2016).

In 2009, the Wetlands Program was awarded funding from The United States Environmental Protection Agency (EPA) Region 6 to map wetlands interpreted from aerial imagery across the Canadian River drainage throughout Northeastern New Mexico. The original map product included mapping all wetlands using the Cowardin (Cowardin et al. 1979) classification, the preferred classification used for the USFWS National Wetlands Inventory (NWI). We wanted our wetlands to be mapped using a classification scheme that was consistent with the national classification as we hoped that the mapping would be included in NWI. In addition we mapped what we call linear wetland features because the NWI only includes the mapping of wetland features that can be delineated as polygons in shape and at least a half-acre in size. New Mexico is interested in protecting and restoring wetlands that occur in confined valleys. These features appear as linears so we mapped them as well. We also included mapping of riparian areas using what is called "A System for Mapping Riparian Areas in the Western United States" (USFWS 2009), which was actually developed right here in New Mexico by our own USFWS NWI Regional Wetlands Coordinator, James Dick. All of this mapping was done using the Cowardin classification so there would be consistency across the mapped areas. An example of this mapping product is shown in Figure 2.
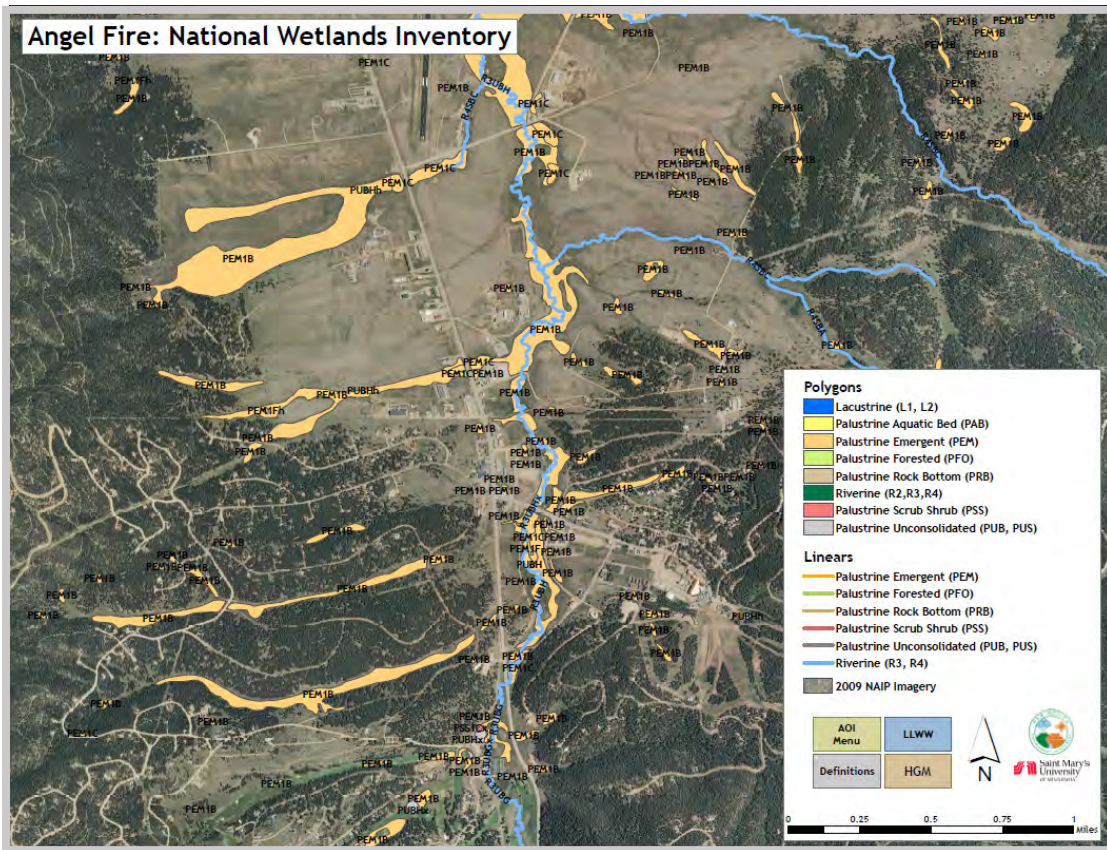
Figure 2.

Detail of wetlands, riparian areas and deep water habitats mapped using the Cowardin classification in the Angel Fire area in New Mexico. The background is 2009 USDA National Agriculture Imagery Program (NAIP) imagery. (GSS 2016)
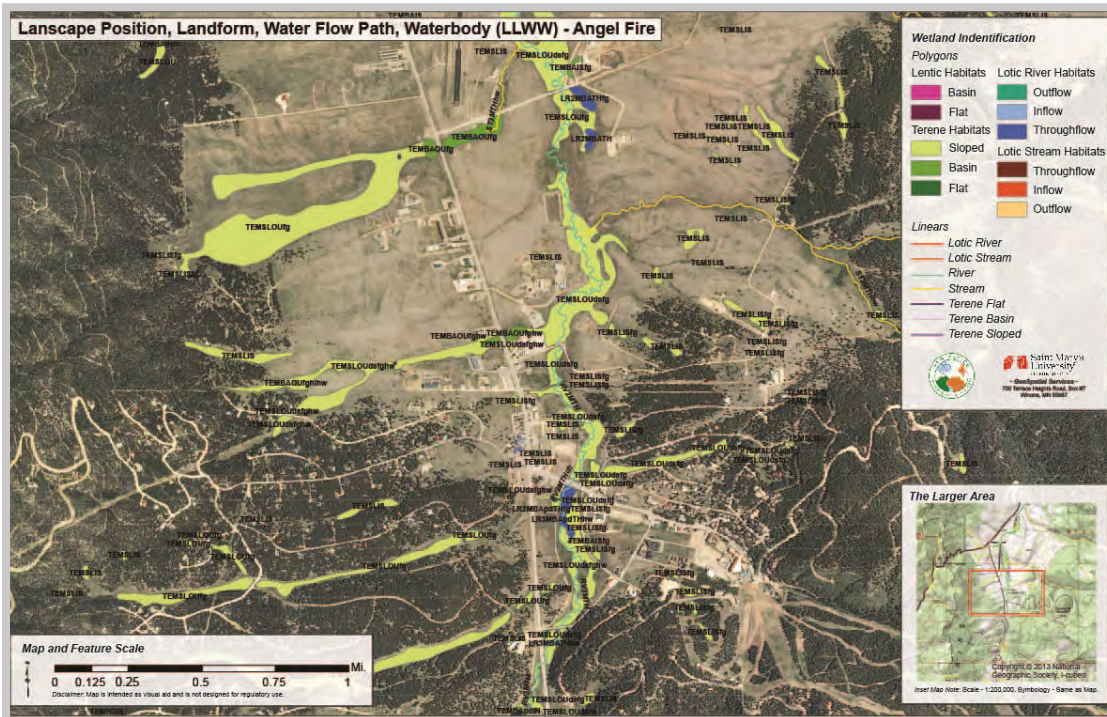

Figure 3.

Detail of wetland mapping using the LLWW classification. This is for the same area as Figure 2, Angel Fire, New Mexico. (GSS 2016)

As a demonstration, the project was designed to not only map wetlands and riparian areas but also to include a classification called LLWW, which stands for Landscape Position, Landform, Water Flow Path and Water Body Type (Tiner 2011a) (Figure 3). The Cowardin classification of wetlands is principally a habitat classification system. The LLWW classification was developed to be complimentary to the Cowardin classification and to expand its utility by including hydrogeomorphic descriptors of the mapped wetlands. The result of using both these classifications to describe each wetland was that now wetland functions could be assigned, as well as their performance relative to other wetlands, over a broad area. The LLWW and NWI mapping data were used to map wetland functions by wetland type. Wetland functional attributes were assigned to all wetland habitats in the project area (Figures 4, 5 and 6).
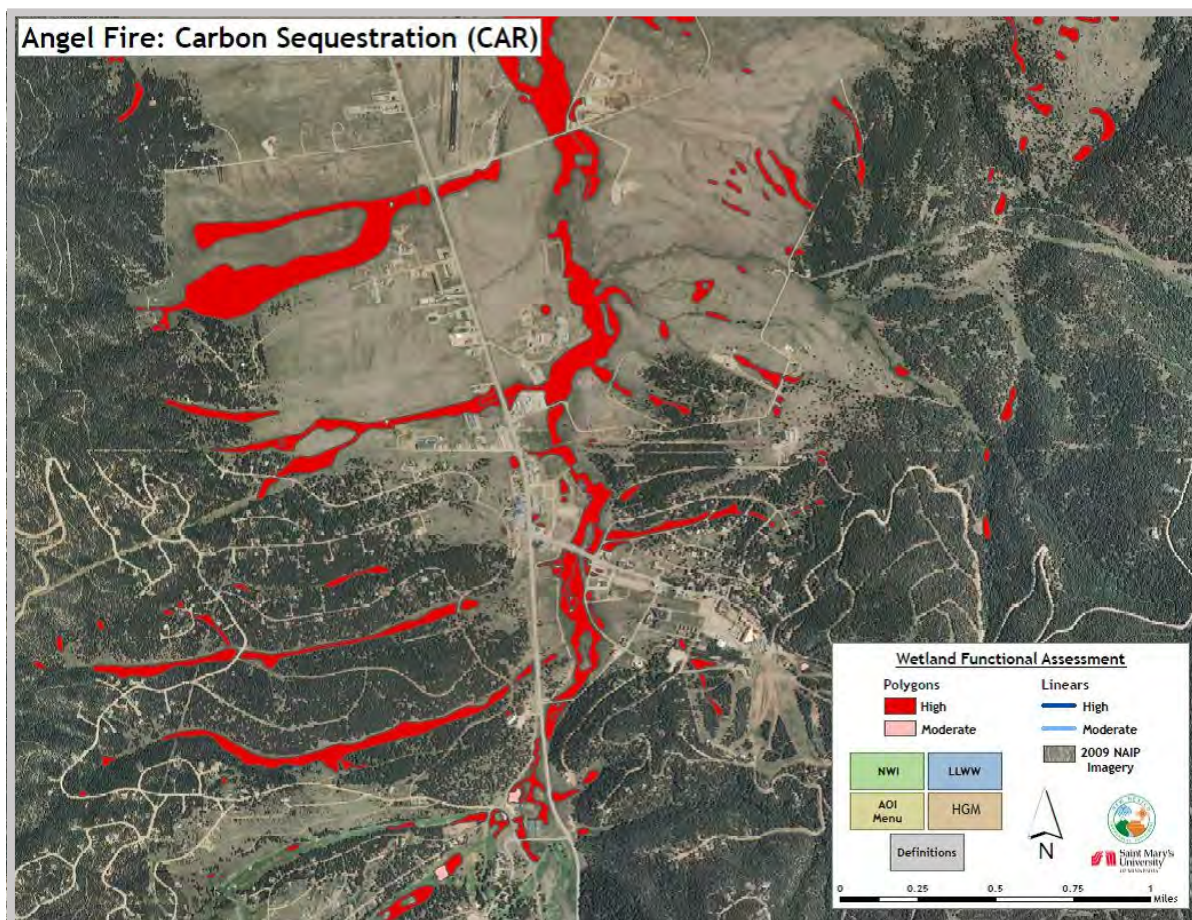

Figure 4. Mapping detail for the Carbon Sequestration function in the Angel Fire area. This page is taken from the Map Book for Angel Fire and is the same area as shown in the previous figures. (GSS 2016)

Figure 5.
Mapping detail for the Streamflow Mainte-nance function in the Angel Fire area. This page is taken from the Map Book for Angel Fire and is the same area as shown in the previous figures. (GSS 2016)

Figure 6.
Mapping detail for the Groundwater Recharge function in the Angel Fire area. This page is taken from the Map Book for Angel Fire and is the same area as shown in the previous figures. (GSS 2016)

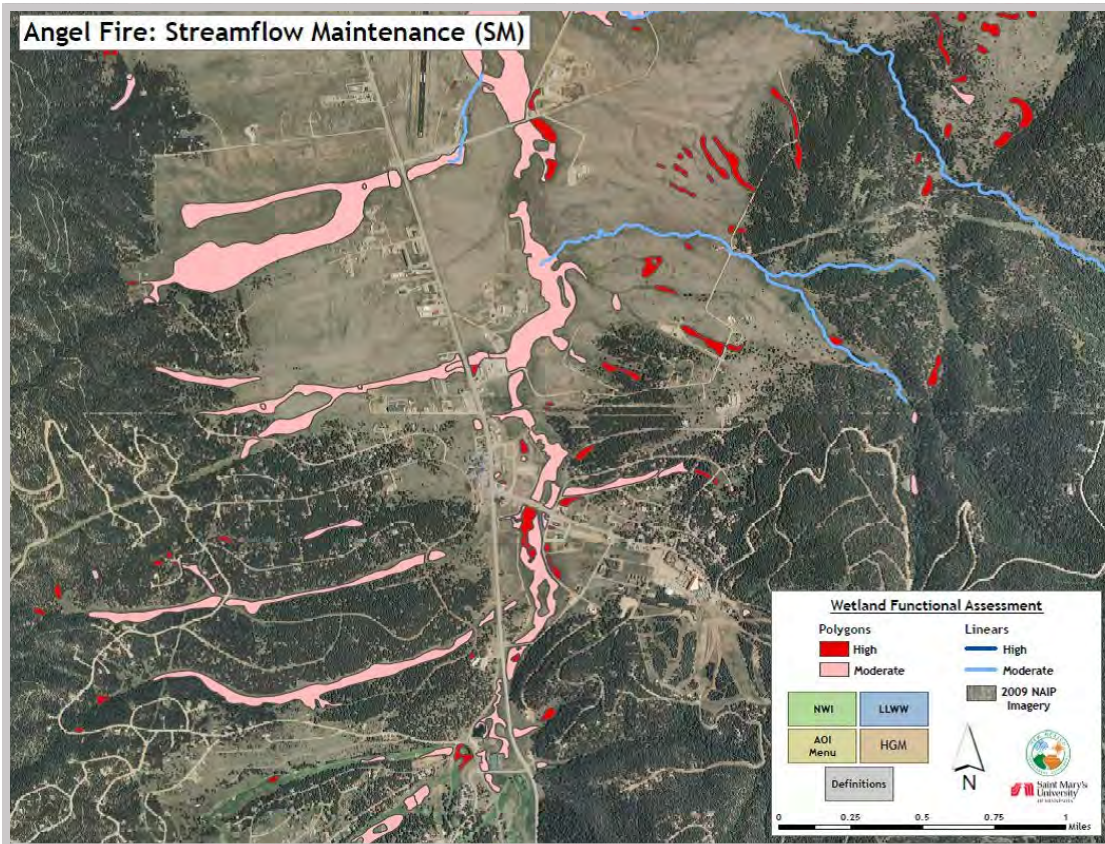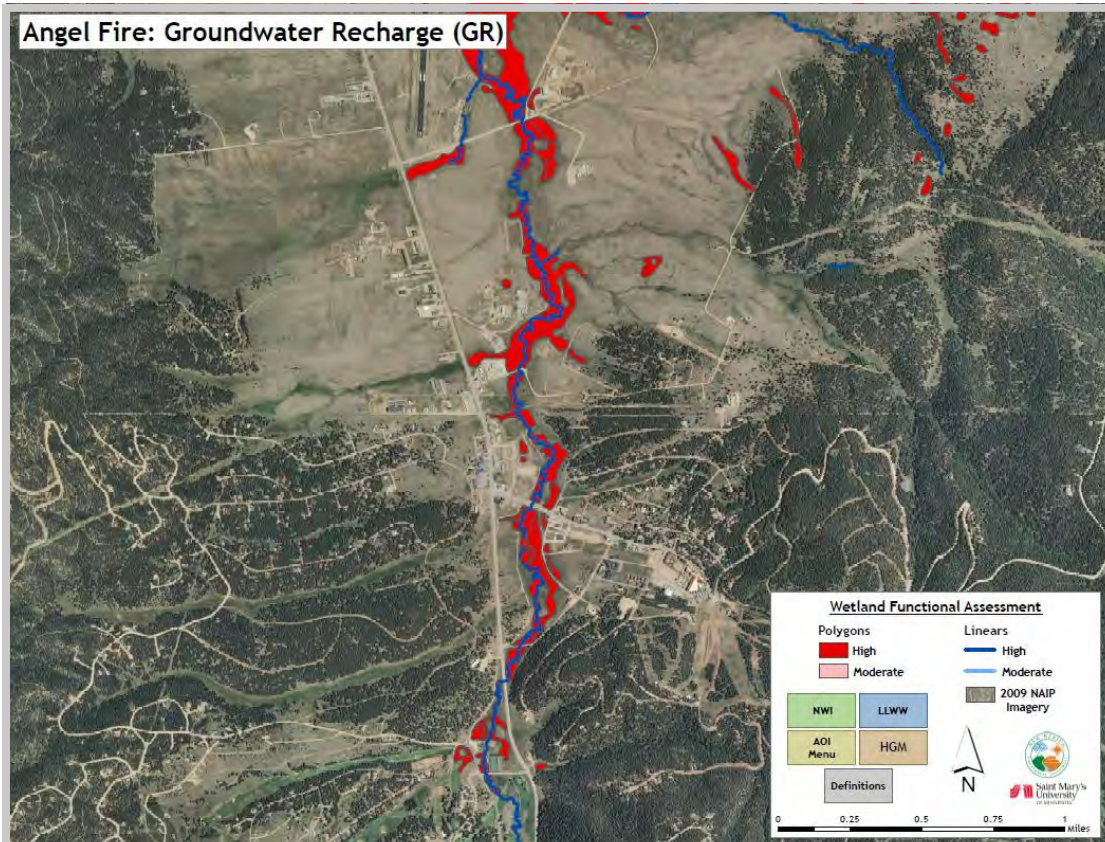Wetlands provide different functions from other surface water systems and have different vulnerabilities. Without specific recognition of their attributes and functions—along with ways to protect and maintain those attributes and functions—wetlands and their important landscape features will be lost. The first step in the assignment of wetland functions for this project was to develop consensus amongst the Project Advisory Committee members on wetland functions that were important to assess for the project area. Then, the group was asked to document the wetland characteristics that were representative of specific functions and to correlate them to both NWI and LLWW codes. Finally, wetlands were categorized as either high or moderate (relative to other wetlands) for the performance of specific functions. Only wetland functions that could be mapped using remote sensing techniques and map products were used in this process. Assignment of twelve different functions where applicable was possible (Table 1).

Function	Description
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 or 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. Wetland Functions assigned to mapped wetlands where applicable for NE and NC New Mexico and USFS Wilderness Wetlands.

Hydrogeomorphic (HGM) subclasses were then applied to all wetland types. The HGM classification (Brinson 1993a) was applied as it is easier for more people to understand wetlands using this classification (Figure 7). Instead of codes, wetlands are given names that fall into six major classes – riverine, depression, lacustrine fringe, slope, mineral flats and organic flats (SWQB Wetlands Program 2012). These broad classes are combined with descriptors and modifiers to become subclasses. The Cowardin and LLWW classifications use complex codes that take a little experience to read and interpret. The HGM classification is also the classification that SWQB Wetlands Program and its partners are using to identify reference sets of wetlands to assess wetland condition (using New Mexico Rapid Assessment Method (NMRAM)). In order to make the HGM assignments, queries required the use of both NWI and LLWW attributes (i.e., codes) and, in many cases, the intersection with additional spatial layers including groupings of EPA Level IV Ecoregions and outputs from a tool called the Valley Confinement Algorithm (VCA) from Nagel et al. (2014).
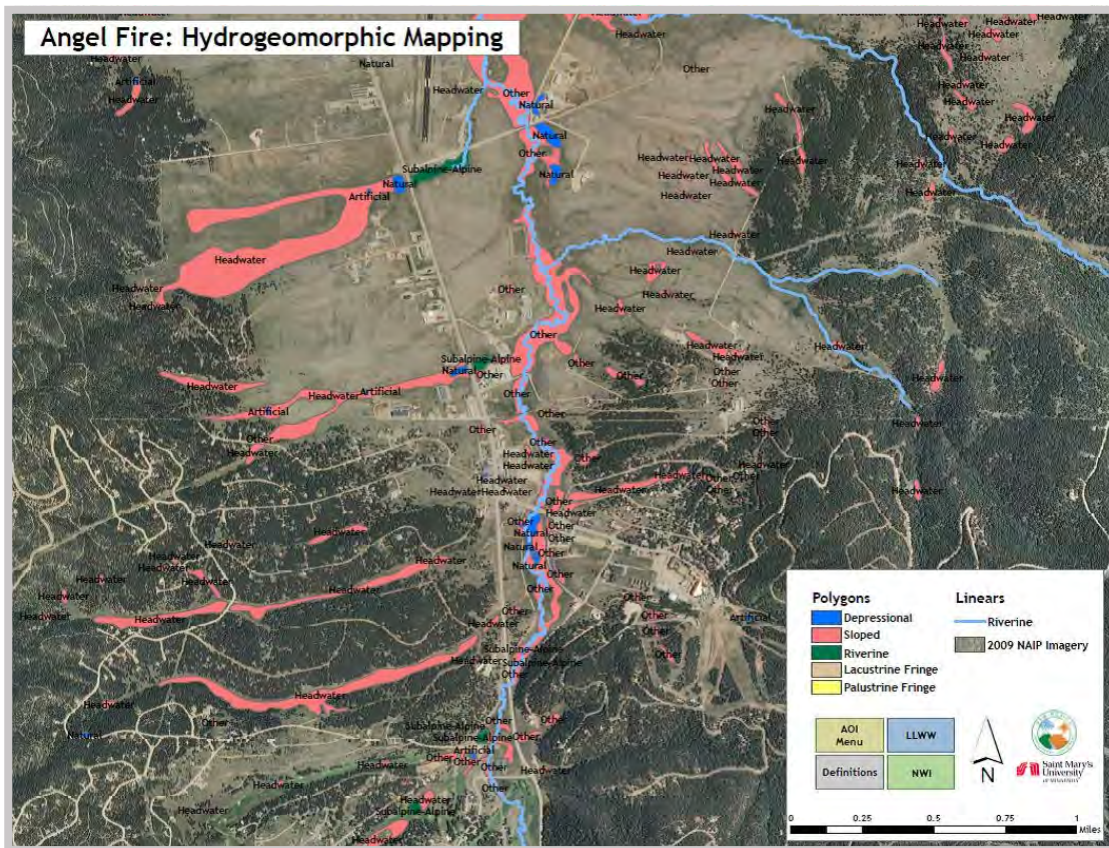

Figure 7. Detail of wetland mapping using the HGM classification in the Angel Fire area. (GSS 2016)

In 2011, the Wetlands Program was also awarded funding from EPA Region 6 to apply this entire landscape level assessment to the Jemez Mountains and surrounding areas. This year, both the Canadian and the Jemez mapping projects were completed. The 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 a NMED wetlands geodatabase and will be available on the SWQB Wetlands Program website in the near future. The Cowardin classification map of these wetlands is available on the USFWS NWI Wetland Mapper (excluding linear wetlands) and can be accessed at **https://www.fws.gov/wetlands/data/mapper.html**. The Canadian project included the completion of LLWW application, identification of functions and HGM classification of all USFS Wilderness wetlands currently mapped and protected as Outstanding National Resource Waters (ONRW) (Figure 8).

Figure 8.
USFS Wilderness Areas of New Mexico. LLWW, Wetland Functions and HGM classification were applied to previously mapped ONRW wetlands as a part of this project. (Robertson et al. 2015)
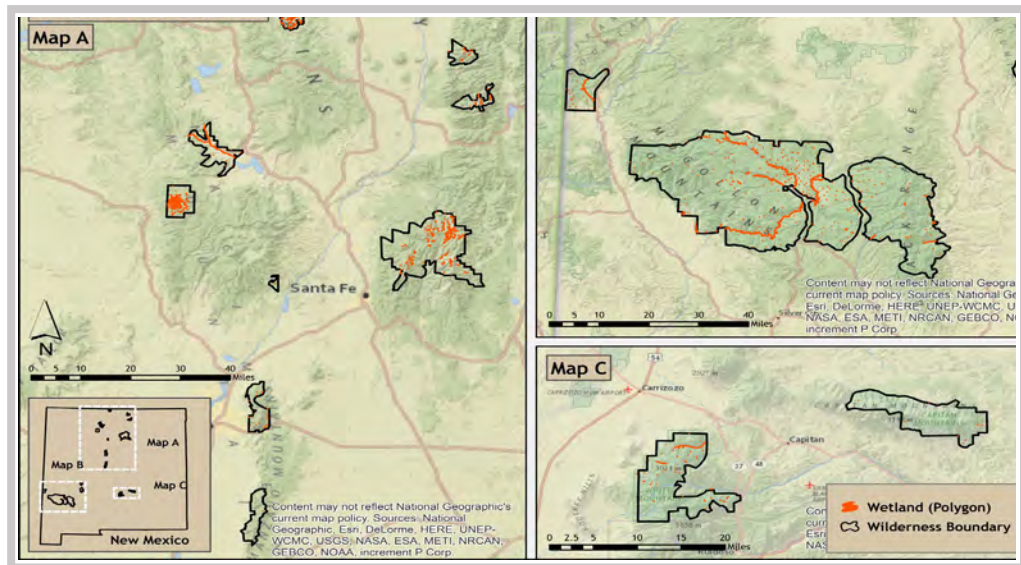
The project includes significant outreach and technical transfer components to let stakeholders in New Mexico, and on a national level, know that these wetland mapping products exist. From these efforts, our mapping products have been used for a variety of applications already. Presentations and transfer of products to Watershed Groups in the project area resulted in map products being used for four Wetland Action Plans. In the Canadian Watershed, new sites for collecting NMRAM data were selected. The USFS is using the map products in the development of Forest Plan revisions; and Amigos Bravos, a statewide NGO, and Western Environmental Law Center, a regional environmental advocacy organization, are using the mapping products to identify "Wetland Jewels," important headwater wetlands and highly functional wetlands in the Carson and Santa Fe National Forests. The intent is to propose special measures to protect these wetlands and prioritize restoration as part of the current Forest Plan Revisions. 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 three more current mapping projects funded by EPA Wetlands Program Development Grants including the Sacramento Mountains area, the Middle Rio Grande (MRG) and mountain ranges east of MRG, and the Gila/San Francisco watersheds and surrounding areas in southwestern New Mexico. The goal is to complete up-to-date mapping and classification for the entire state, except for tribal lands (Figure 9).

An additional product from this mapping effort is the development of interactive PDF map books that are available for: Angel Fire, Eagle Nest, Highway 19 Crossing, Maxwell Wildlife Refuge, Pecos, Raton, Rio Fernando de Taos, Upper Red River, Ute Park, Village of Mora, Canjilon, Chama, and Valle Seco. These map books contain all the different classifications and functional attributes for each area, and are available for citizens and groups to interact with map products in a PDF format when ARC GIS is not accessible.

These data will be available on the SWQB Wetlands Program website in the near future, in an effort to reach out and transfer significant programmatic technical components to stakeholders that have an interest in watershed protection in New Mexico, and at the national level. The GIS Section of NMED has been hard at work developing web maps that will soon be available at **https://gis.web.env.nm.gov/NMWetlands/**.
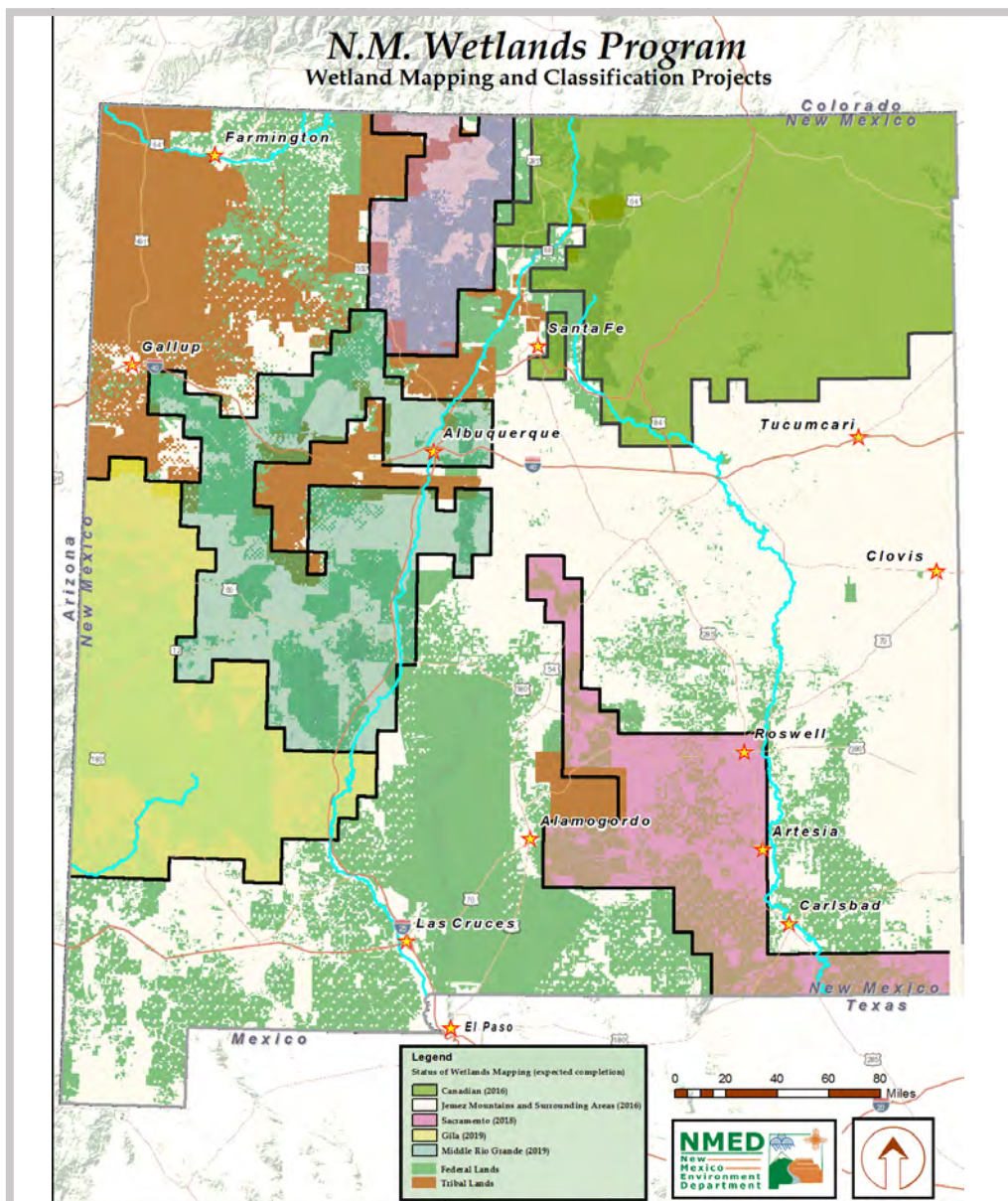
Figure 9.
Map of completed and current mapping projects conducted by the SWQB Wetlands Program.
(Liz Zeiler 2016)

This product provides the demonstration of important and versatile tools for understanding wetlands resources in northeastern New Mexico. For more information or to obtain map books, contact Maryann Mc-Graw, Wetlands Program Coordinator, **maryann.mcgraw@state.nm.us**.

Cited work found in this article can be requested by sending an email to the editor at susan.ossim@state.nm.us

Acknowledgements

Request for Proposals
for Surface Water Quality Improvement Projects to be released

By Abe Franklin, WPS Program Manager

The Watershed Protection Section (WPS) plans to release a request for proposals (RFP) in November for on-the-ground surface water quality improvement projects. Streams with completed watershed-based plans, and a limited category of waters with similar planning complete (Category 4B waters), will be eligible. The RFP will focus on meeting the goals developed in total maximum daily load (TMDL) documents, or (in the case of Sandia Canyon) on meeting water quality goals in a Category 4B Demonstration. The RFP will be used to select projects that improve water quality sufficient for them to meet water quality standards, or make measurable progress toward that goal.

Eligibility

As noted above, projects that implement watershed-based plans or New Mexico's only Category 4B Demonstration will be eligible. Watershed-based plans (WBP) are a specific type of planning document, described further at **www.env.nm.gov/swqb/wps/WBP**. Currently, the following watersheds have watershed-based plans:

- ***Animas River watershed*** (in San Juan County)
- ***Cimarron River watershed*** (including all tributaries)
- ***El Paso – Las Cruces watershed*** (downstream of Caballo Reservoir, also known as Paso del Norte watershed)
- ***Gallinas River watershed*** (upstream of the City of Las Vegas diversion)
- **Mora River watershed** (a middle section in the Upper Canadian Plateau ecoregion)
- ***Pecos Headwaters watershed*** (portions upstream of where I-25 crosses the Pecos River)
- ***Rio Nutrias watershed*** (this Rio Nutrias is a tributary of the Rio Chama)
- ***Rio San Antonio watershed*** (this Rio San Antonio is in the larger Conejos watershed)
- ***Rio Santa Barbara***

The watershed-based plans are available at **www.env.nm.gov/swqb/wps/WBP/Accepted**. Sandia Canyon's Category 4B Demonstration is available at **www.env.nm.gov/swqb/303d-305b/2014-2016/LANL**.

All types of organizations will be eligible to implement these projects, regardless of which organization developed the watershed-based plan or Category 4B demonstration. We might receive eligible proposals from federal agencies, state agencies, soil and water conservation districts, Indian Nations, Pueblos, Tribes, nonprofits, or for-profit firms.

Project Terms

The schedule in the RFP will indicate a target date for contract or interagency agreement approval in late fall, 2017. The RFP will request that proposed project terms not exceed four years. Some of the funding designated to support projects selected through this RFP is available only through June 30, 2020, and for that reason the RFP will state a preferred (but not required) project term of thirty-three months or less.

a few words about Flow Impairment

Some readers might read the RFP and see reference to Category 4C streams, and wonder what that means. Each edition of the State of New Mexico Clean Water Act §303(d)/§305(b) Integrated List places all of the assessed streams and lakes ("assessment units") into assessment categories. A Category 4C stream is "impaired for one or more designated uses, but does not require development of a TMDL because impairment is not caused by a pollutant." These streams are identified in the State of New Mexico Clean Water Act §303(d)/§305(b) Integrated List as being impaired by "low flow alterations." In the 2016-2018 edition of the List, only thirteen out of 820 assessment units are in Category 4C. Two of these (Wolf Creek in the Mora watershed, and Glorieta Creek in the Pecos watershed) are within the areas covered by watershed-based plans, and will be eligible for projects under the RFP. As with any stream or project, projects that are prioritized in a WBP are likely to receive higher scores than projects that are not.

StreamStats Version 3 Now Available in New Mexico

The USGS StreamStats project, a web-based GIS application, is now up and running in New Mexico!

StreamStats can be used to estimate key characteristics of user-identified ungaged watersheds including:

- drainage area
- mean basin elevation
- elevation of stream outlet
- mean annual precipitation
- mean precipitation in October through April
- mean basin slope
- and maximum 24-hour precipitation that occurs on average once in 100 years.

StreamStats can also be used to estimate peak flows from ungaged sites, with return intervals of two, five, ten, 25, 50, 100, and 500 years. Users are encouraged to learn more at the main StreamStats web page (**http://water.usgs.gov/osw/streamstats**). The part that is operational in New Mexico is at **http://streamstatsags.cr.usgs.gov/v3_beta/viewer.htm?stabbr=NM**.

Data available in other parts of the country include low flow statistics and cover statistics such as percent coniferous forest and percent wetlands. Keep an eye out for future updates that may bring some of these features to **New Mexico**!

EVENTS & ANNOUNCEMENTS

October

October 26th - Glenwood. The Gila National Forest (GNF) invites you to a Forest Community Meeting. 4:00-6:30 pm. Glenwood Community Center, 14 Menges Ln, Glenwood, NM.   The Gila National Forest recently released the draft assessment report for feedback as part of the Forest Plan Revision process. To download a copy of the draft assessment report, please visit the Forest Plan Revision website at: http://go.usa.gov/h88k
The Gila National Forest highly encourages feedback on the draft assessment report and participation moving forward.

October 27th - Reserve. The Gila National Forest invites you to a Forest Community Meeting. 4:00-6:30 pm. Catron County Fairgrounds Building, Hwy 12, Reserve, NM. See the GNF event above for more details.

October 29th - Algodones to Corrales. Join NM Wilderness Alliance and Quiet Waters Paddling to explore the primitive aspects of the lifeline of New Mexico from Algodones to Corrales (weather permitting). Experienced guides will provide history and discuss important issues about this gorgeous stretch of the Rio Grande River. Enjoy the fall colors along the bosque, and possibly sight some sandhill cranes. To register: http://www.nmwild.org/events-outings/31-fall-rio-grande-float-algodones

November

November 1st - Truth or Consequences. The Gila National Forest invites you to a Forest Community Meeting. 4:00-6:30 pm. Albert Lyon Event Center, Sierra County Fairgrounds 2953 South Broadway, Truth or Consequences, NM. See the Oct. 26th GNF event above for more details.

November 2nd - Silver City. The Gila National Forest invites you to a Forest Community Meeting. 4:00-6:30 pm. WNMU Global Resource Center, West 12th Street & North Kentucky Street, Silver City, NM. See the Oct. 26th GNF event above for more details.

November 3rd - Las Cruces. The Gila National Forest invites you to a Forest Community Meeting. 4:00-6:30 pm. NM Farm and Ranch Museum, 4100 Dripping Springs Rd, Las Cruces, NM. See the Oct. 26th GNF event above for more details.

November 9th - 11th - Albuquerque. Join the Quivira Coalition at their 2016 Conference. Please see their website for more information and to register: http://quiviracoalition.org/

November 14th - Santa Fe. NMED /SWQB Wetlands Program's northern New Mexico Wetlands Roundtable. The theme will be in celebration of the National Park Service Centennial highlighting "National Parks and National Monuments and their Wetlands and Water Resources". 9:00 a.m. to 4:00 p.m. at the Toney Anaya Building, 2550 Cerrillos Road, Rio Grande Room (2nd Floor) Santa Fe, NM.
For more information: contact Karen Menetrey (Karen.Menetrey@state.nm.us; 505-827-0194)

December

December 7th - Las Cruces. NMED /SWQB Wetlands Program's southern New Mexico Wetlands Roundtable. The theme will be in celebration of the National Park Service Centennial highlighting "National Parks and National Monuments and their Wetlands and Water Resources". 9:00 a.m. to 4:00 p.m. at the Las Cruces City Hall, 700 North Main Street, Room 2007-B&C (2nd floor), Las Cruces, NM.
For more information: contact Emile Sawyer (Emile.Sawyer@state.nm.us; 505-827-2827)

If you have a related event that you would like distributed, please send an email to
susan.ossim@state.nm.us