New Mexico Statewide Parcel Data

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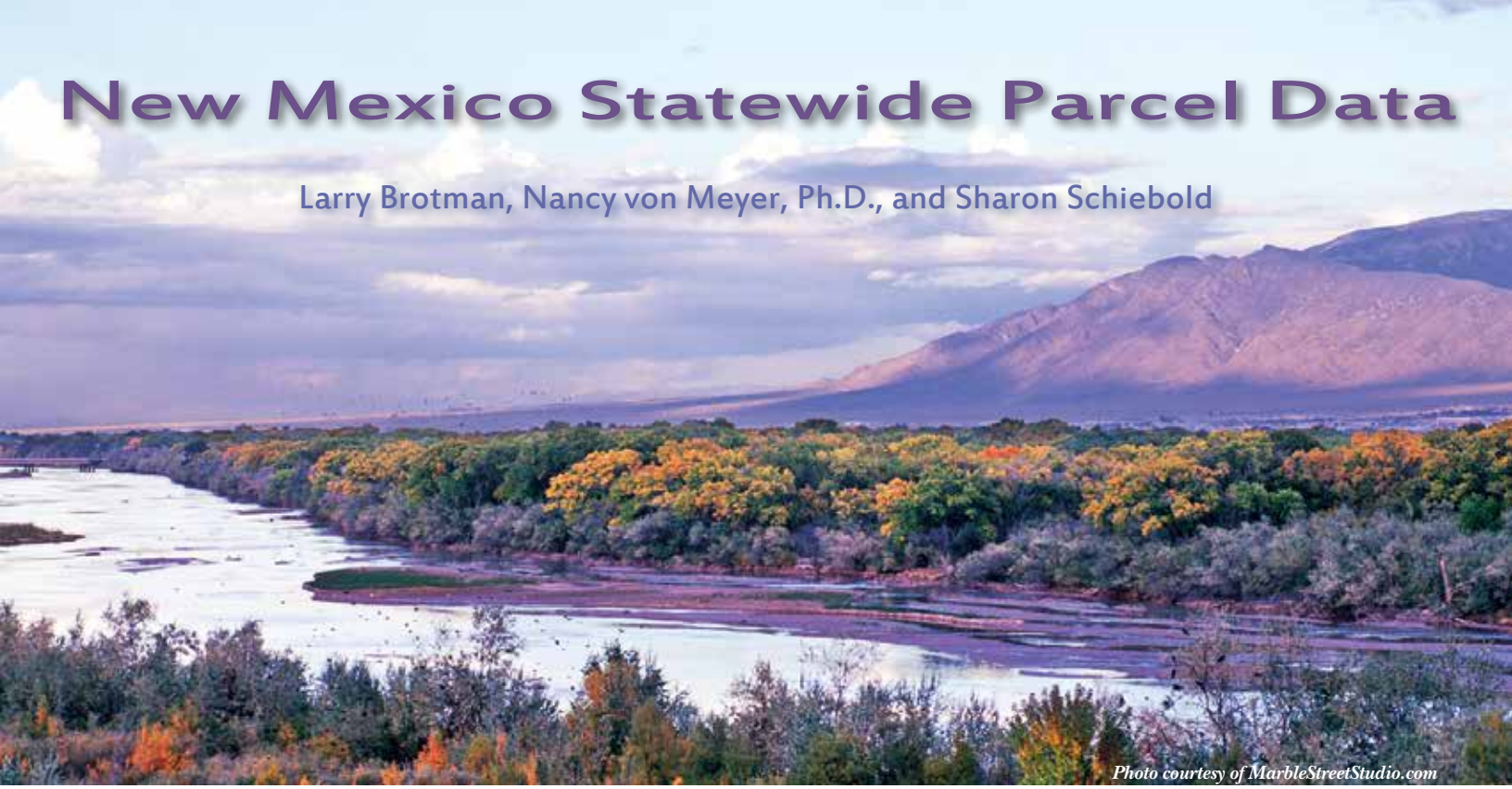

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New Mexico has 33 counties, all at various levels of automation and geographic information system (GIS) adoption. The New Mexico Taxation and Revenue Department (TRD), via its Property Tax Division (PTD), provides the local county assessment community with GIS and data automation support to encourage the use of automated mapping and to apply standards for data collection and processing.

There are many business drivers for the statewide aggregation and standardization of parcel data—the relatively recent New Mexico Broadband Program (an initiative aimed at defining broadband availability and enhancing its adoption), wildland fire response support, public safety, and enhanced property information are some of the most visible. The cooperation among and support of the state agencies that collect, aggregate, consume, and publish geospatial data have made it possible for many programs to benefit from the efforts of GIS-related programs.

Project History

In 2006 the Federal Geographic Data Committee (FGDC) Cadastral Subcommittee was funded by the Office of Wildland Fire of the U.S. Department of the Interior to assemble and standardize available digital parcel data within wildland fire hazard areas. The U.S. Forest Service and Department of Interior wildland fire groups had previously determined wildland fire modeling could be used in conjunction with mapped structure location points to determine from a planning perspective how and where to deploy resources to fight the fire. The locally collected and maintained parcel data were identified as the most current and reliable source for structure locations on privately owned lands.

The first collection of parcel data for this effort in New Mexico, in 2007, was a very labor-intensive process. Each county was individually called or visited, and the wildland fire project goals and data needs were explained. The benefits of the data sharing were explained by using the experiences from Montana. Because the parcel data from New Mexico had not been used in fire response, no local examples were possible.

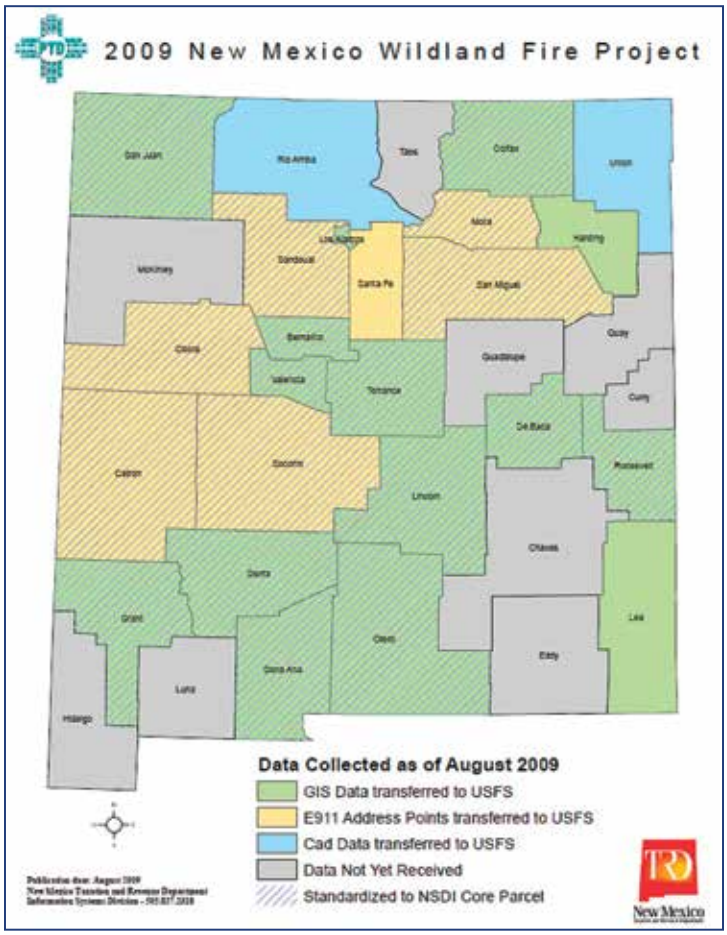
Almost half of the state was covered in that first year. Local data were aggregated, and information on structure locations was extracted to create a structure point file that could be viewed in the Wildland Fire Decision Support System (WFDSS).

In 2008 the data collection and aggregation became easier. The counties were now familiar with the wildland fire uses, and TRD/PTD's role in the effort was better understood. TRD/PTD sent a letter to each county assessor in January 2008 requesting that available parcel data be provided to TRD, which would then standardize the data and provide it to the Wildland Fire Program. The standardization of the locally provided data was not done in the 2007 collection, so this processing was an added step.

In the 2008 collection effort parcel polygons were used if they were available. In a few of the high-hazard areas, site address points from the 911 systems were used as a surrogate to locate structure points. These locally provided address locations were produced by the state's Enhanced 911 (E-911) Program/Rural Addressing Program and were used in only a few counties. The address data were not widely available in 2008. The resulting data delivery was a mix of parcel information and structure locations and is summarized in figure 1.

In 2010 and 2011 the structure locations were updated from the site address points only. As a function of the E-911 Program of the Department of Finance and Administration (DFA), most of the state's counties have been using a GIS-based application to map road centerlines, assign site addresses, and create point features to represent locations for emergency dispatch purposes. From a Wildland Fire Program perspective, TRD and the subcommittee's interest in this program was piqued when it learned of Lincoln County's use of an E-911/rural addressing extension that allows assessor parcel attributes to be stored with address points and their respective data. Again, as the use of WFDSS has been refined, integrating the address points so diligently developed by counties for rural addressing and E-911 may prove to be very beneficial when digital parcel polygons are not available or are in a format supportive of the application. Although supplemented with data developed by the U.S. Geological Survey (USGS), this concept was illustrated during the Trigo Fire.

Figure 1. Collection status in 2009



The Trigo Fire

In April 2008 the Trigo Fire broke out between Torrance and Valencia counties in the Manzano Mountains of central New Mexico.

Using a combination of imagery, which is analyzed to find color and signal characteristics of rooftops and man-made structures, the USGS developed an initial inventory of possible structure locations. In Valencia County parcel data and assessment information, which indicate which parcels had structures data, was combined with the imagery results to verify the structure locations (see figure 2). In some cases the imagery found structures that were not on the tax roll; these structures were primarily either under construction or ancient structures in Native American country that were not on the tax roll. The image analysis and parcel data assisted in identifying multiple structures on the same parcel, generally indicating outbuildings or agricultural use buildings. This information was of great assistance to the fire response planning. Using this combination of data proved that applying both a site address inventory and the parcel data provided the most complete effective solution to support wildland fire response planning.

Collaboration among personnel at Torrance County, Valencia County, the U.S. Forest Service, the USGS, the subcommittee, and TRD clearly demonstrated the benefits derived from multi-jurisdictional collaboration in planning

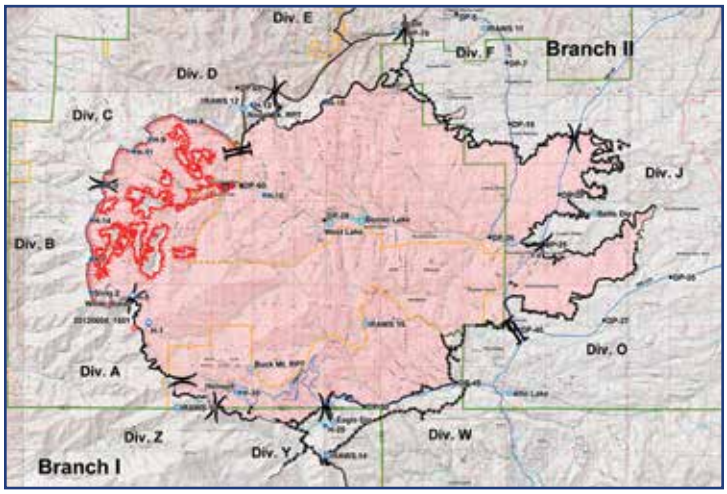
Figure 2. Extent of Trigo fire

for and responding to potentially catastrophic fire events.

The Little Bear Fire

Another key event occurred on June 4, 2012 when a lightning strike set off a wildland fire in Lincoln County, New Mexico, in the White Mountain Wilderness area. Because of available fuel and dry conditions, the fire spread quickly. By the time the fire was fully contained, approximately 44,000 acres were involved. Figure 3 shows the final fire perimeter in light red shading.

Figure 3. Perimeter of Little Bear Fire



By using the WFDSS and parcel data from New Mexico, an estimated 371 structures within the fire perimeter were located, and slightly more than 12,000 structures in the fire response planning area were involved. Post-fire analysis determined that more than 250 homes and structures were destroyed, making the Little Bear Fire one of the most destructive fires in New Mexico's history. The Federal Emergency Management Agency (FEMA) provided more than $1 million to reimburse the county for costs incurred from cleanup and response (http://www.kob.com/article/stories/s2960949.shtml and http://www.tomudall.senate.gov/?p=press_release&id=1239).

The State Department of Homeland Security and Emergency Management's experience with the Little Bear Fire in Lincoln County raised the awareness of the importance of assessor parcel data, preferably in a standardized form. The parcel data were recognized as an essential component in working with federal entities such as FEMA to assign value to property loss. The attribute richness of the parcel data added more value to the structure locations than the site address points alone.

2012 Data Collection and Standardization

While the site address points used in 2010 and 2011 did provide an inventory of structure locations, information on the structure or parcel use, the values and owner type (public, private) were needed to further support wildland fire response and cleanup. The effort that began in 2007 was renewed in 2012 with the collection and standardization of the parcel mapping data.

A first step in this process was to finalize the state parcel data standard for the aggregated parcel data. The table at the end of this article lists the finalized New Mexico Parcel Data Standard. This is a format for the counties to provide parcel data to the New Mexico TRD/PTD or for TRD to transform data provided by the counties. The goal of this standard is the assembly and aggregation of the varying county data into a common format that can be used for analysis and display. This standard builds on the national parcel publication standard, adding attributes specific to New Mexico.

Mapping from the Property Identifier

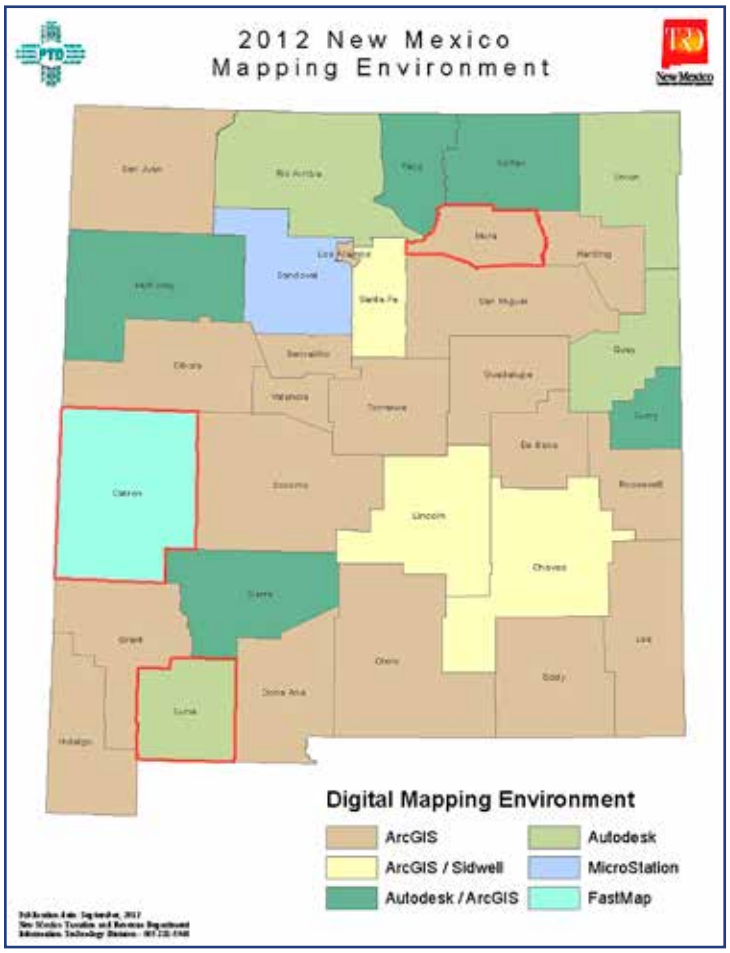
A few New Mexico counties do not have GIS real property parcel features, either as polygons or points, to represent data contained within their property valuation or mass appraisal systems. Many counties have computer-aided mapping, which does provide a computer-based map, but this mapping cannot be readily linked to database attributes from the computer-assisted mass appraisal (CAMA) system. Often the computer-aided drafting (CAD) mapping organizes the parcel maps into map sheet tiles, further complicating the ability to combine the data into a single database or a statewide data set. Figure 4 illustrates the mapping technology used by the New Mexico counties.

At the very least, having GIS point features and their respective data attributes represent parcels in the assessor's database can be highly beneficial to supporting data sharing with entities concerned with public safety, asset and property protection, and access to utility, transportation, and communication (broadband) infrastructure.

With funding provided by the New Mexico Broadband Program, three New Mexico counties, the TRD, and the University of New Mexico's Earth Data Analysis Center (EDAC) have collaborated to develop a method that geocodes the Uniform Property Code (UPC) assigned by New Mexico county assessors to each property contained within their respective appraisal/valuation systems. The UPC is created through a reference to the Public Land Survey System (PLSS) and is location based.

The three counties outlined in red in figure 4 were selected as a pilot project to test whether the UPC, as pre-

Figure 4. Digital mapping environment in New Mexico



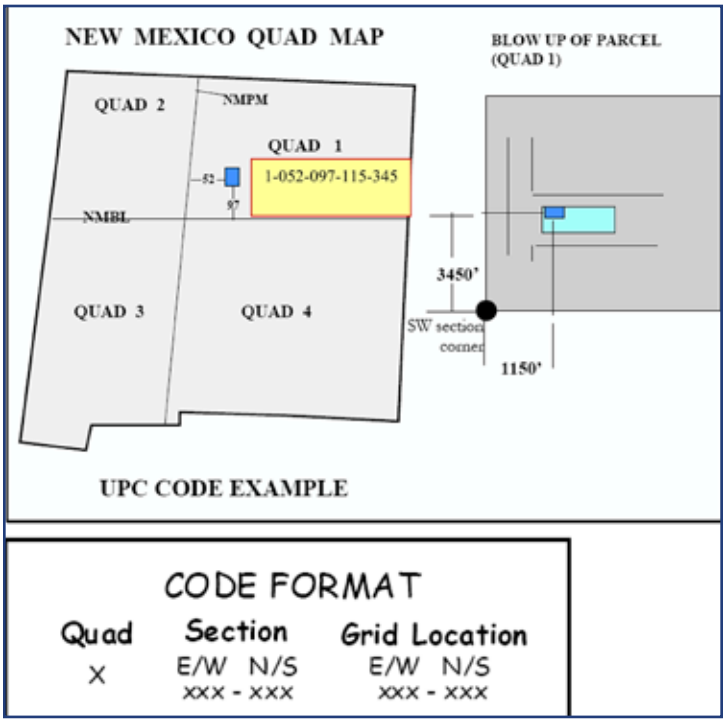
scribed in the New Mexico Mapping Manual, could be used to generate a point location for parcels. The following three counties were selected for the reasons indicated:

- Catron County
  - Very limited "digital" parcel data
  - No way to "connect" assessor database with maps
- Luna County
  - Digital parcels in CAD only with the UPCs as annotation.
  - No connection between assessor database and maps
- Mora County
  - GIS polygons 10+ years old and not maintained since developed
  - No connection between assessor database and maps.

The UPC is, by definition, tied to the PLSS section and section division lines. The UPC identifies a source line and provides an offset distance from the source line to the parcel centroid; this is shown in figure 5.

To run the geocoding, the standardized PLSS data were processed to support relating the PLSS data to the UPC.

Figure 5. UPC format in New Mexico



The process for determining section reference points was as follows:

1. Convert Second Division (1/16-th aliquot part and government lot) corners to vertices. The standardized PLSS data set, CadNSDI, was used as the source for these data.
2. Identify the vertex nearest to the prime meridian–baseline intersection for each section.
3. Clean up any missing or incorrect near points

Figure 6 shows the resulting PLSS point grid used as the base for geocoding or mapping the UPCs from the PLSS data for Luna County.

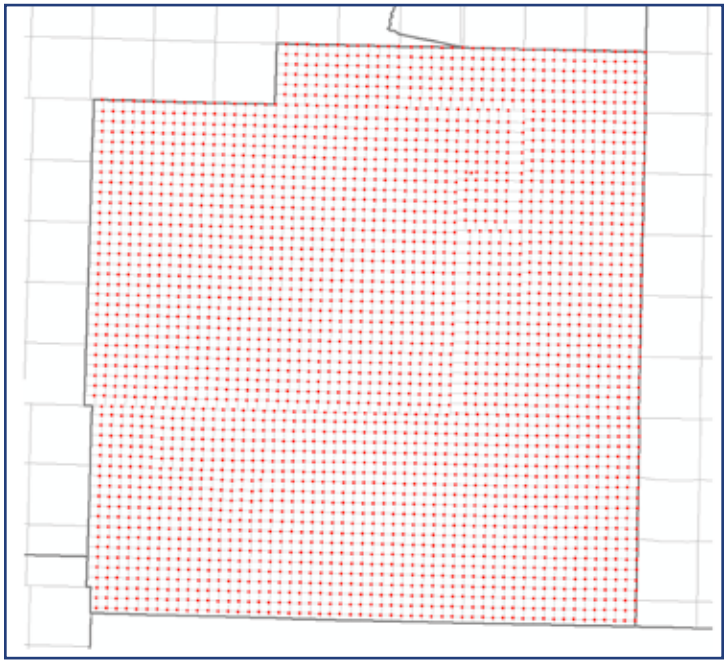
The process for geocoding the UPCs was as follows:

1. Convert the UPC, for example, 3051135428286 is recoded as NM230230S0090W0SN150.
2. Identify the section and its reference point.
3. Create a new point based on the number of feet east-west (4,280 ft) and north-south (2,860 ft) within the section. This is the UPC-coded parcel centroid.

Catron County Results

Catron County provided a unique challenge because it covers two PLSS quadrants. The first time the UPC mapping routines were run on this data set, the points were "mirrored and flipped." After the mapping routines had been corrected, there were still problems because many points fell outside the county boundaries. Further investigation revealed that within the county assessment data

Figure 6. Sample PLSS point grid for mapping UPCs for Luna County



non-PLSS "dummy" codes were used to identify personal property and mobile homes. The routine was further modified to identify valid ranges of UPC numbers that would be expected to map real property and land parcels. There also were many duplicate UPC values that had to be combined to successfully join the mapped points to the assessor attributes.

Figure 7 shows a portion of the county mapped points and a portion of the attribute table that was built from the joined features.

Figure 7. Quemado UPC results for Catron County

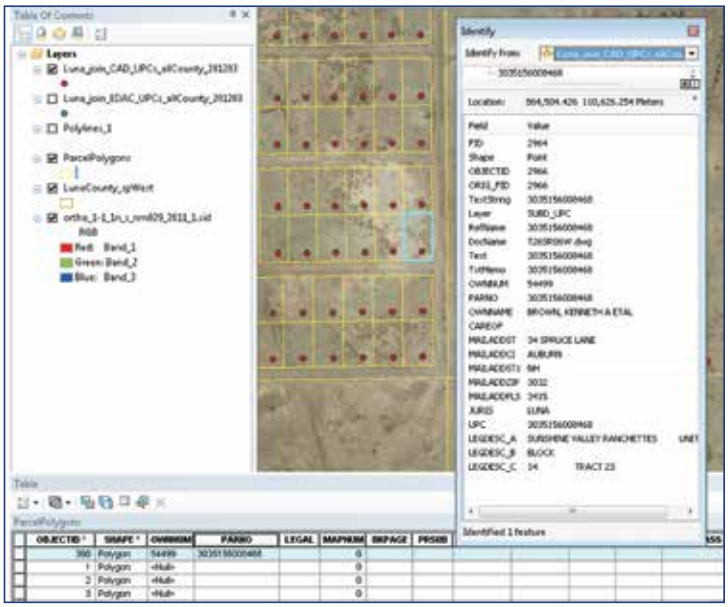
Luna County Results

Luna County had very good parcel data in CAD maps drawn and maintained in AutoDesk. The processing of UPC codes was done to support migrating the data from CAD to GIS. Again, as in Catron County, the valid range of UPC values for the county was developed, and dummy codes for personal property and mobile homes were eliminated. Luna County had 87 separate CAD maps (.dwg files) covering the county.

For Luna County the UPC annotation on the CAD maps produced the most accurate result. Because of the many irregularities in the PLSS in Luna County, the annotation data more accurately placed a point for each parcel record. Once Triadic (assessment software) attributes were joined to UPC points, a spatial join could be used to join the points/attributes to parcel polygons built from the CAD maps, yielding parcel polygons with CAMA attributes.

Figure 8 illustrates the resulting map with the attributes from the joined assessor tables shown in the list of attributes.

Figure 8. Mapping results for Luna County



Mora County Results

In Mora County roughly half of the county area is covered by a land grant. In April 2012 the state completed a project to extend the PLSS line work across the land grants, creating a virtual index for the PLSS that could be used for the UPC coding. This index was extended from the New Mexico CadNSDI and is now a feature data set integrated into the CadNSDI geodatabase. This extended PLSS is not surveyed on the ground and is not an official legally binding land description system. It is only a computer-generated extension of the PLSS used for indexing and defining the UPC for parcels in the land grant.

The Mora County pilot test identified some coordinate rounding errors in exporting data. The rounding was inherent in the data export routines in the ArcMap software. This problem was fixed by changing the export

procedures, so the UPCs could be mapped in their correct location. Figure 9 shows the resulting map.

Benefits and Challenges

There is significant value in building and maintaining a seamless, statewide GIS parcel layer. Comprehensive digital parcel maps, in addition to being critical components of the property valuation and assessment processes in a county, serve as an important reference source for city, county, regional, state, federal, and nongovernmental entities that depend upon accurate property maps to meet the needs of their constituents. Decision support and business processes at all levels of government that contribute to operations, public health and safety, asset management, transportation, economic development, and resource allocation, conservation, and management rely on current property maps to be effective. When integrated with data representing themes such as topography, satellite and aerial imagery, hydrography, natural resources, transportation and utility networks, administrative boundaries, structures, and cultural features, property ownership maps are considered a critical component of a state's spatial data inventory and base map.

New Mexico completed a Parcel Data Business Plan in 2009. Some of the benefits and challenges of building an aggregated statewide standardized parcel data set from the locally developed data were documented in that plan.

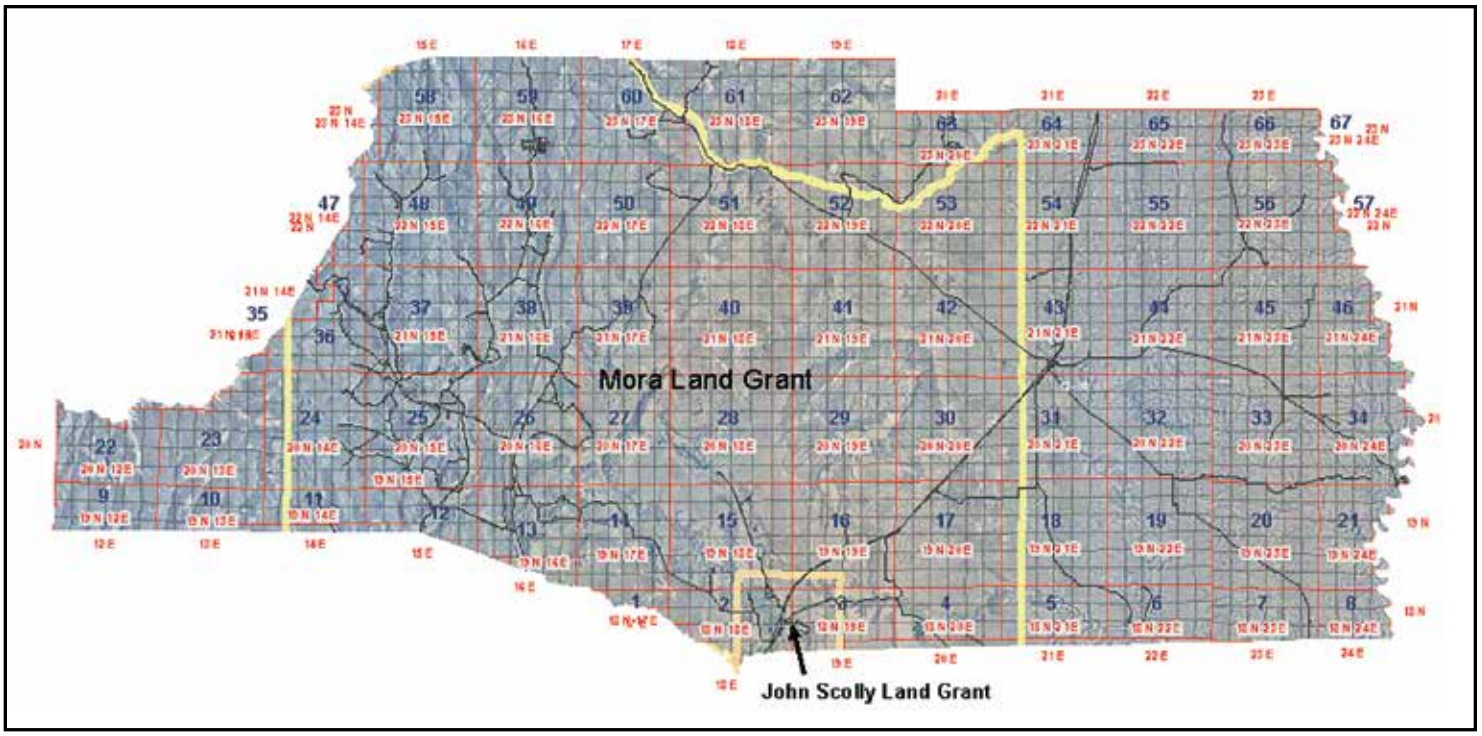
The benefits of standardized parcel data for the state were identified as follows:

- The data can be placed in context with other state data sets, providing solutions for many cross-jurisdictional data needs.
- The data provide an opportunity to establish partnerships and communication with local parcel producers.
- The data provide communication and connection with intergovernmental applications.
- The data provide an essential data set for state operations to build other statewide parcel-based data sets.
- The data increase the essential role of state coordination:
  - Property data (assessed value, market value, improvements, net taxable value, and so on) can be viewed, symbolized, and analyzed in a map.
  - Sales transactions can be viewed, symbolized, and analyzed in a map.
  - Inconsistency in assessed value versus sale prices can be discovered.

Figure 10 shows the taxable values in Catron County symbolized by the size of the circle; larger values have a larger circle. Thus, it is possible to observe the value patterns at a glance and identify any possible outliers. With statewide data like this, values can be compared across county boundaries and statewide values can be seen at a glance.

For emergency responders and other essential government users, the standardized parcel data set

Figure 9. PLSS extended into the John Scolly Land Grant in Mora County



- Reduces the time and level of effort required to obtain parcel data
- Reduces redundant efforts in collecting, assembling, and analyzing locally produced parcel data
- Increases the credibility of the products from emergency response agencies because they know the currency and quality of their parcel information
- Saves the time and expense of compiling locally produced parcel data sets each year
- Allows for applications to be built around a consistent data source.

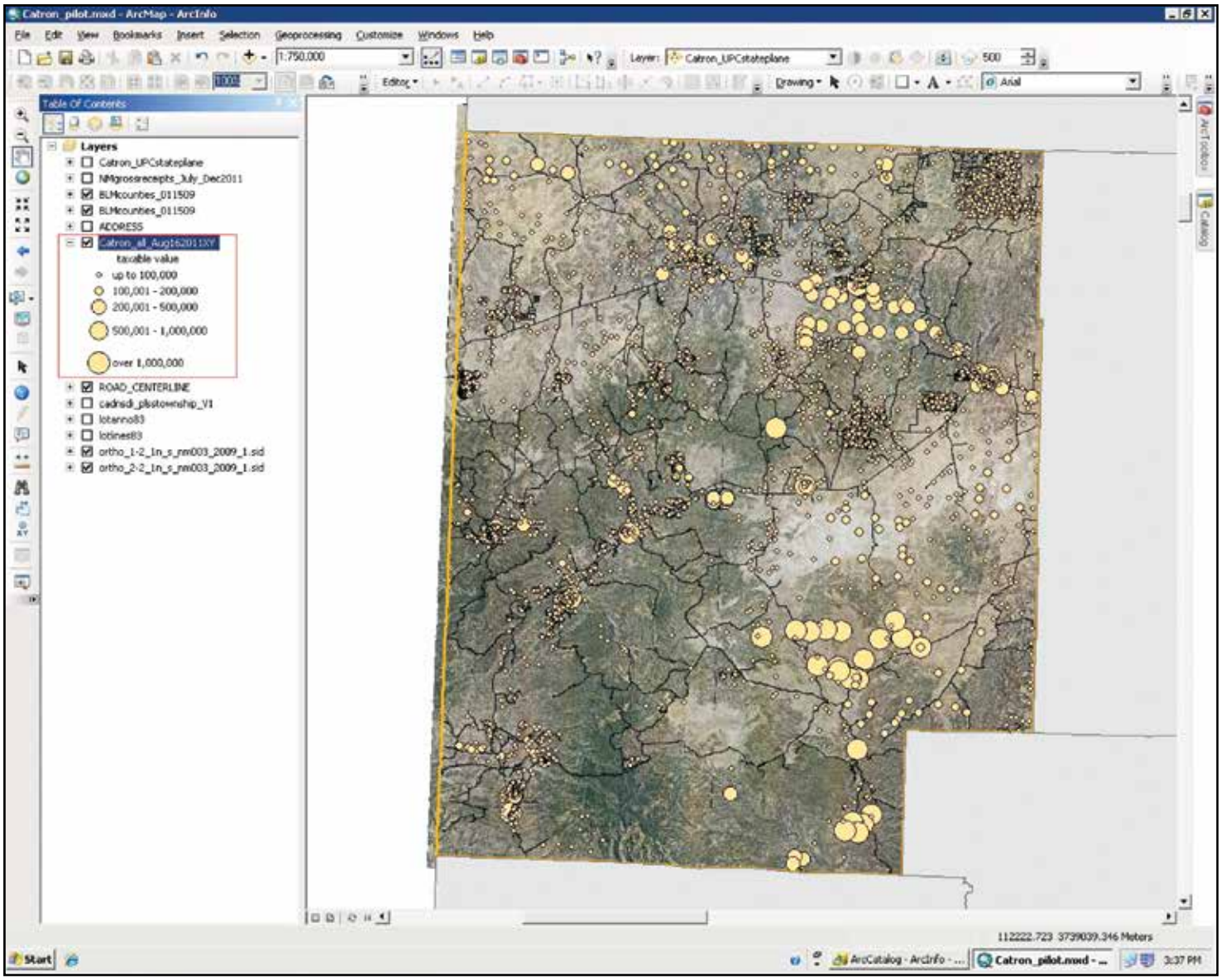
For citizens affected by emergencies, the standardized parcel data set

- Ensures that important information to service the needs of the citizens can be accessed in times of emergency
- Increases the value of the local taxpayer investment by reducing duplicative collection
- Allows local government staff to provide essential support other than data distribution during emergencies
- Increases the likelihood that responding agencies will coordinate their efforts, reducing response times to citizens' needs.

Moving Forward

One goal over the next few years is to mentor assessors and their staff to modernize and improve their workflows and

Figure 10. Parcel points symbolized by total value for Catron County



business practices to create data (mapped and attributed) that meet the state parcel data publishing standard. The status of the parcel mapping and standardization efforts as of December 2012 is as follows:

- As a result of a UPC geocoding project with EDAC (funded with Broadband money), the PTD has a blend of county parcel points and polygons (mostly polygons) with varying degrees of data attribution.
- A near-term goal (a few months) is to build a standardized statewide parcel point feature class converting existing polygons to points and loading those along with points from the UPC geocoding process in the pilot counties; a long-term goal is to mentor the few remaining counties without parcel polygons to modernize tools, skills, and workflows to develop data that meet standards and allow for statewide standardized parcel polygons.
- Current efforts in parcel data aggregation are limited by the availability of staff time for loading the parcel polygons into the NSDI Core Parcel feature class within the New Mexico CadNSDI (standardized GIS representation of the PLSS). The PTD does not distribute any assessor parcel data, aggregated or not, to any entity without the express permission of respective assessors.

A second important foundation theme for New Mexico is the address points. These are used in emergency response, broadband services mapping, and wildland fire management. Assessors distinguish between "mailing address" (where the treasurer's property tax bill must go for payment) and "site address" or "situs" (the physical location of a property if it has been assigned an address). There are still a number of counties that do not record situs in their assessor databases, but several do and this trend is growing. The state maintains a site address point location for other applications but is planning on merging the site address efforts so the information is kept current and correct in all the databases that need the information.

Larry Brotman is the GIS Coordinator for the New Mexico Taxation and Revenue Department (TRD), Information Technology Division. In this capacity he serves as the primary liaison for GIS (geographic information systems) services and support to TRD's eight divisions including the Property Tax Division (PTD). As a GIS resource to PTD, Larry also provides technical support and mapping guidance to the state's 33 county assessor offices. Brotman has a master's degree in educational technology from the University of New Mexico.

Nancy von Meyer, Ph.D., is vice president of Fairview Industries in Pendleton, South Carolina. She is a nationally recognized leader in land records and use of cadastral information for decision support. She has been at Fairview Industries since 1983 and has more than 25 years of GIS system design and implementation experience. Her efforts have been applied in the areas of wildland fire management, local land use planning and management, energy, and economic analysis.

Sharon Schiebold is a consultant with Shared Vistas, LLC, in Grand Rapids, Michigan. Sharon has 15 years of experience in county level parcel land record administration and management and 20 years of experience with GIS. Sharon graduated from Michigan State University with a combined education in Natural Resource Management and Policy and Cartography. Recently, Sharon has been active in implementing the NSDI Cadastral Standard for Wildland Fire in over 200 counties in 12 Western states.

Table. New Mexico Parcel Data Standard

Standard Field Names	Field Type and Length	Description of Data Element
STNAME	String (2)	The state name
STFIPS	String (2)	The state FIPS code, two-digit code
CNTYNAME	String (50)	The county name
CNTYFIPS	String (3)	The county FIPS code, three-digit code
STCNTYFIPS	String (5)	The state and county FIPS codes combined as a single field. Used to relate and link the parcel information to other records. It creates a unique national parcel identifier when used as a prefix to the local parcel number.
GNISID	Integer (Long)	The geographic names information system identifier for the local place for the parcel. The default value is the county GNIS number, but as this data set develops, individual parcels may have a GNIS identifier, such as local parks or attractions.
SOURCEAGENT	String (100)	The originating agency or source of the information for the feature or the data steward for data set
PARNO	String (25)	The local parcel number for the parcel record
NPARNO	String (25)	The local parcel number with the state and county FIPS added to the beginning of the local parcel number
CAMAPROPID	String (10)	Unique property number assigned by the valuation/assessment system and associated with a specific parcel
CAMAID	String (10)	Unique account/owner number assigned by the valuation/assessment system and associated with a specific taxpayer
LOCID	String (18)	Unique parcel identifier generated by calculating X and Y coordinate values for a point located within a parcel polygon
PARUSECODE	String (50)	The local assessment parcel use code
PARUSEDESC	String (100)	The local assessment parcel use description
STRUCT	String (1)	Is there a structure or improvement on the parcel (Y = yes, N = no)?
MULTISTRUCT	String (1)	Does this parcel have multiple structures (Y = yes, N = no)? If the total number of structures is not known but it is known that there are multiple structures, this is populated. It is also populated when the exact number of multiple structures is known and the STRUCTNO is greater than 1.
STRUCTNO	Integer (Long)	The number of structures on the parcel. This is populated when the source data indicate how many structures. This is used primarily to support emergency planning and response.
BLDGCLASS	String (50)	Building classification, that is, residential, commercial, and so on
BLDGTOTSQFT	String (25)	Total building square feet
BLDGTOTVAL	Double	Total value for all structures
IMPROVVAL	Double	Improved value
IMPRVLALMISC	Double	Total miscellaneous value
LANDVAL	Double	The value of the land on the parcel
PARVAL	Double	The total value of the parcel (IMPROVVAL + LANDVAL)
PARVALTYPE	String (50)	The type of value reported in the parcel value fields such as assessed or market value
ASSESSVAL	Double	Assessed value
ASSESSDATE	Date	Most recent assessment date (00/00/0000 format)
ASSESSDTTX	String (15)	Assessment date as a text
VETEXEM	String (50)	Veterans exemption number 1
VETEXEMAMT	Double	Veterans exemption number 1 amount applied
VETEXEMB	String (50)	Veterans exemption number 2
VETEXEMBAMT	Double	Veterans exemption number 2 amount applied
HEDHOUSEXEM	Double	Head of household exemption amount applied
DISABEXEM	String (1)	Disability exemption (Y= yes, N = no)
NETTAXVALUE	Double	Full taxable value less all exemptions
SDNDFA	String (1)	Property tax rate district (sometimes referred to as school district); DFA Certificate of Property Tax Rates "category" identification
ZONING	String (255)	Legal zoning
OWNTYPE	String (50)	The owner type (e.g., federal, state, private). The domain of values for this attribute is international, tribal, federal, state, county, local, private, nonprofit, other, unknown.
OWNNAME	String (200)	The primary surface owner name. The full name may be populated or the components of the name (first and last).
OWNFRST	String (100)	The primary surface owner first name
OWNLAST	String (100)	The primary surface owner last name

Table. New Mexico Parcel Data Standard (*continued*)

Standard Field Names	Field Type and Length	Description of Data Element
SUBSURFOWN	String (200)	The name of the subsurface rights landowner
SUBOWNTYPE	String (50)	The subsurface owner type (see surface owner type domain list)
MAILADD	String (200)	The full mailing address as a single field. The mailing address may also be broken into its components.
MADDRNO	String (10)	The mailing address number
MADDSTNAME	String (100)	The mailing street name, the name without the type and directions
MADDPREF	String (5)	The mailing street prefix
MADDSTR	String (50)	The mailing street name, the name without the type and directions
MADDSTTYP	String (10)	The mailing street type, such as ST, AVE, BLVD
MADDSTSUF	String (10)	The mailing street suffix, typically a direction
MUNIT	String (10)	The mailing address unit, suite, or apartment number; may also be the half number
MCITY	String (100)	The mailing city name
MSTATE	String (2)	The mailing state name, two-letter abbreviation
MZIP	String (15)	The mailing ZIP code
SITEADD	String (200)	The full mailing address as a single field. The mailing address may also be broken into its component parts.
SADDNO	String (10)	The mailing address number
SADDSTNAME	String (100)	The mailing street name, the name without the type and directions
SADDPREF	String (5)	The mailing street prefix
SADDSTR	String (50)	The mailing street name, the name without the type and directions
SADDSTTYP	String (10)	The mailing street type, such as ST, AVE, BLVD
SADDSTSUF	String (10)	The mailing street suffix, typically a direction
SUNIT	String (10)	The mailing address unit, suite, or apartment number; may also be the half number
SCITY	String (100)	The mailing city name
LEGDECFULL	String (255)	The full tax legal description. This is generally needed when the parcel data do not include a map of the parcel.
LEGDECONE	String (255)	The full tax legal description
LEGDECTWO	String (255)	Legal description continued if one field is not enough
SUBDIVISION	String (200)	The name of the subdivision or condo that the parcel is in
TOWNSHIP	Integer	Township of parcel location
TOWNDIR	String (1)	Township direction (N = north, S = south)
RANGE	Integer	Range of parcel location
RANGEDIR	String (1)	Range direction (W = west, E = east)
SECTION	Integer	Section of parcel location
SALPRICE	Double	Sale price
SALDATE	Date	Sale date (00/00/0000 format)
SALDATETX	String (15)	Sale date as a text field
SALVALID	String (1)	Indicates "arm's-length" transaction or other (Y = yes, N = no)
SALINVALID	String (1)	If the sale is invalid, explain.
SALASSESVAL	Double	Assessed value at time of most recent sale
SALVALAFTSL	Double	Assessed value following most recent sale
RECRDAREATX	String (20)	The record or recorded area as a text field. This may include the units of area as well.
RECRDAREANO	Double	The record or recorded area as a numeric field.
GISACRE	Double	The area of the feature in acres, computed from the GIS. This is not the record area.
SOURCEREF	String (255)	The reference to the source document. This could be a reference to a map or plat or a deed as well as including the document type.
SOURCEDATE	Date	The date of the source document (listed in the source reference) that was used to generate the parcel information
REVISEDDATE	Date	The date of the last revision of the parcel record. This may be the initial create date if that is the last revision.
REVDATETX	String (15)	The date (as text) of the last revision of the parcel record. This may be the initial create date if that is the last revision. Date as a text field is useful to accommodate varying date formats from various databases.