



FGDC Cadastral Data Subcommittee

Annotated Bibliography: Foundational Documents for Building a Cadastral National Spatial Data Infrastructure

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Cadastral Data Subcommittee**

**Annotated Bibliography: Foundational Documents for Building a Cadastral
National Spatial Data Infrastructure**

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Introduction

The FGDC Cadastral Data Subcommittee (Subcommittee) has been working on various aspects of Cadastral National Spatial Data Infrastructure (Parcels, Public Land Survey System, and Offshore Continental Shelf Grid System) for over ten years. It has produced over one-hundred and forty publications on standards, business requirements, best practices, project reports, concept definitions, case studies and implementation strategies. All of the Subcommittee's reports, publications, presentations and meeting notes have been posted the FGDC Cadastral Data Subcommittee's web site <http://www.nationalcad.org/>. Within these documents the Subcommittee recognized that there are a set of foundational publications that are core to understanding the Cadastral NSDI and the strategy that the Subcommittee is pursuing. This annotated bibliography provides an overview of these publications along with a few related publications from other sources. The Subcommittee's web site also includes educational documents and programs that provide background on cadastral data and principles. These documents are not included in this bibliography. There are five sections to the bibliography; *Key Concepts and Definitions*, *Standards*, *Implementation*, *Business Cases* and *Inventories*. To provide the reader of a sense of the evolution of the ideas the publications within each section are organized in ascending order by its publication date.

Key Concepts and Definitions

The Subcommittee works with multiple levels of governments and has found that to facilitate understanding among the many parties it is critical to define key terms and concepts. *Production, Publication and Project Data* describe three permutations of cadastral data. *Authority and Authoritative Source* relates to the previous article by focusing on the legal relationships between production and publication data. Arguably the article on *State Parcel Data Stewardship* should be included in this section but it was determined that it was more appropriate for it to be in the *Implementation Section*.

Parcels: Production, Publication and Project Data (2006 - 2007)

What are the three permutations of a parcel database for the same geography? The different types of parcel data include *Production, Publication and Project Data*. When consumers and producers of cadastral data are discussing the sharing of data these concepts can cause considerable confusion. *Parcel Production Data* is the complete database that is managed by data producers (as examples assessors, parcel mappers or surveyors) for daily or regular business operations; *Parcel Publication Data* is a small subset of the *Production Data* consisting of less than 25 attributes.. it is designed to meet 95% of the user community needs, it consists of less than twenty-five attributes that are updated on an annual basis; *Project Data*, as the term implies, is additional information needed for a "project" that is a limited geographic extent defined from an event or for a specific need using the publication data to define the project extend and the parcels or other data about which more is needed.

FGDC Cadastral Data Subcommittee, *Parcel Data: Production, Publication and Project Data*, Internet, 2008, <http://www.nationalcad.org/showdocs.asp?docid=1064&navsrc=Project>

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Authority and Authoritative Sources (2008)

Definitions about “Authority” to facilitate communication: A description of the issues and definitions of the terms about different types of authority as it relates to cadastral data. Because of the legal issues related to ownership and rights in land the use of the terms *authority* and *authoritative* for cadastral data need to be clearly articulated. The vision for the National Spatial Data Infrastructure (NSDI) and the National Cadastre within the NSDI is to have a single source of *authoritative cadastral data* that is controlled and managed by designated *data stewards*. Access to this data is facilitated by compiling and integrating the data to *trusted data sources* at state or regional levels.

FGDC Cadastral Data Subcommittee, *Authority and Authoritative Sources: Clarification of Terms and Concepts for Cadastral Data*, August 2008, Internet, <http://www.nationalcad.org/showdocs.asp?docid=1045&navsrc=Report&navsrc2=>

Standards

Standards are an exercise in compromise: The Subcommittee’s standards can be divided into *production* and *publication standards* (see Key Concepts and Definitions). The Cadastral Data Content Standard is the *production standard* while the remaining standards are focused on standards for *publication*. The *BLM Point ID Standard* is critical for allowing users to uniquely identify corners in the Public Land Survey System (PLSS) and to share this data. The *Cadastral NSDI Reference Document* describes the *publication standard* for both the PLSS and parcels. It was found that the user community was usually concerned with either the PLSS or parcels but not both so two documents are being developed, the *Cadastral NSDI Reference for Core Parcel Data* was written to describe the parcel data publication standard and the *Cadastral NSDI Reference for Corners of Common Control* is a work in progress.

Cadastral Data Content Standard Version 1.3 (2003)

The Production Standard: The FGDC Standard Reference Model, *Cadastral Data Content Standard for the National Spatial Data Infrastructure, Version 1.3, Third Revision*, (Standard) was created to address all conditions for surface and subsurface rights and interest. The target audience are the data base managers for parcels, the Public Land Survey System and for other corners of common control. The format of the standard (semantic definitions) which is dictated by the FGDC Subcommittee standards process can be daunting to read. Normally such a database is better expressed in terms of an entity relationship diagram. The Florida Department of Revenue’s *Florida Parcel Data Model* is one expression of the standard that is in this more familiar format. Nancy von Meyer’s text book, *GIS and Land Records: the ArcGIS Parcel Data Model*, provides a guide for implementation of the Cadastral Standard.

FGDC Cadastral Data Subcommittee, *Cadastral Data Content Standard for the National Spatial Data Infrastructure, Version 1.3, Third Revision*, Internet, May 2003, Internet, <http://www.nationalcad.org/showdocs.asp?docid=110&navsrc=Report&navsrc2=>

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Florida Department of Revenue, *Florida Parcel Data Model*, FGDC Cadastral Data Subcommittee, Internet, 2006,
<http://www.nationalcad.org/showdocs.asp?docid=165&navsrc=Search&navsrc2=>

Nancy von Meyer, *GIS and Land Records, The ArcGIS Parcel Data Model*, ESRI Press, 2004, Internet, 2008, <http://gis.esri.com/esripress/display/index.cfm?fuseaction=display&websiteID=80&moduleID=0>

PLSS – BLM Point ID Standard (2006)

A standard for a unique identifier for corners: A description of the standard for the publication of corner IDs from the BLM's cadastral data computation files. The publication of corners with this ID supports the Cadastral NSDI development and enhances data sharing and data integration. The *Wisconsin Corner Point Identification System* provides an example implementation of the BLM Point ID Standard.

Bureau of Land Management, *Geographic Coordinate Database (GCDB), Publication Point ID's*, FGDC Cadastral Data Subcommittee, Internet,
<http://www.nationalcad.org/showdocs.asp?docid=157&navsrc=Standards&navsrc2=>

Wisconsin Corner Point Identification System, Wisconsin Department of Natural Resources, FGDC Cadastral Data Subcommittee, Internet, 2006,
<http://www.nationalcad.org/showdocs.asp?docid=156&navsrc=Report&navsrc2=>

Cadastral NSDI Reference Document (2007)

Publication Standard (PLSS and Parcels): A description of the Cadastral NSDI, its components and the public and private business processes that define the content. The Cadastral National Spatial Data Infrastructure (Cadastral NSDI) has been defined by the FGDC Cadastral Subcommittee as *a minimum set of attributes about land parcels that is used for publication and distribution of cadastral information by cadastral data producers for use in applications and business processes.*

FGDC Cadastral Data Subcommittee, *Cadastral NSDI Reference Document*, 2007, Internet,
<http://www.nationalcad.org/showdocs.asp?docid=158&navsrc=Report&navsrc2=>

Cadastral NSDI Core Data for Parcels (2007)

Parcel Publication Standard: The *Cadastral NSDI Parcel Data Publication Standard*, also known as the *Parcel Core Data*, has been developed to support the initial or first pass needs of the parcel data user community. The core data may be all of the data that a user needs or it is used to identify which parcels the user will need more information about. This brief paper lists and defines the parcel core data attributes. The Subcommittee is continually evaluating this set of core attributes as a part of many of the projects that it has undertaken (See Implementation Section).

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Nancy von Meyer and David Stage, *Cadastral NSDI Core Data for Parcels*, FGDC Cadastral Data Subcommittee, Internet, 2007,
<http://www.nationalcad.org/showdocs.asp?docid=1063&navsrc=Search&navsrc2=>

Cadastral NSDI Core Data for PLSS and Other Corners of Common Control (TBA)

PLSS Publication Standard: December 2008 - This is a work in progress which will be published in the near future. See *Cadastral NSDI Reference Document* for details.

Implementation

The *4000 Challenge* is a reference to the issues that must be addressed to compile and publish the more than four thousand independent sources of parcel data that are managed mostly by local governments but it also includes cadastral records managed by federal and state agencies. The Subcommittee's strategy is for the states to compile, integrate and publish local government parcel data with state and federal land records data for government to government data sharing. *An Assessment of Best Practices for Seven Parcel Management Programs* study was conducted in 2006 to describe the components of successful state parcel management programs. The *Cadastral NSDI Parcel Conversion Cost Estimate* provides an estimate of the cost of modernizing parcels in 2006. Although the estimate may be outdated the cost breakout by component provides a methodology for estimating the cost for basic parcel modernization effort with a known area and parcel count. The *Business Plan Template* provides guidance on how to structure a State Parcel Data Strategic/Business Plan. The *State Parcel Data Stewardship* paper gives a description of requirements for different levels of *State Stewardship* for parcel data.

An Assessment of Best Practices for Seven Parcel Management Programs (2006)

Model parcel management programs: The goal of Subcommittee is to support the development and maintenance of digital parcel data nationwide through standards and partnerships to support government to government data sharing. Recognizing the importance of state administered programs for facilitating parcel modernization in their states the Subcommittee conducted an evaluation of seven state parcel management efforts (Alabama, Arkansas, Florida, Montana, North Carolina, Tennessee and Wisconsin) for best practices that could be transferable to other states.

David Stage and Nancy von Meyer, *An Assessment of Best Practice for Seven Parcel Management Programs*, FGDC Cadastral Data Subcommittee, 2006, Internet,
<http://www.nationalcad.org/showdocs.asp?docid=168&navsrc=Search&navsrc2=>

Cadastral NSDI Parcel Conversion Cost Estimate (2007)

A cost estimate for parcel conversion: This document provides a cost estimate of the resources needed to complete the modernization of privately owned lands in the United States. Although there has been considerable increase in the number of counties that have finished parcel conversion since 2006, the overall estimate is based on a cost breakdown of the different

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components of conversion that results in a cost per parcel. This can be used as the basis for estimating the cost of parcel modernization within a given geography.

David Stage and Nancy von Meyer, *Cost Estimate for the Completion and Implementation of the Private Sector Parcel Component of the Cadastral NSDI*, FGDC Cadastral Data Subcommittee, 2007, Internet, <http://www.nationalcad.org/showdocs.asp?docid=175&navsrc=Search&navsrc2=>

State Parcel Management Program, Business Plan Template (2006)

A template to build state parcel management program: A template for state or regional organizations to build a business plan to support the conversion, maintenance, publication and integration of spatial parcel data and the PLSS. The audience for this document is the state spatial data managers that will work with the cadastral community to build a parcel management business plan for their state. When the plan is completed it will describe the current state cadastral infrastructure, areas for improvement, a set of action items for improving the states cadastral infrastructure and a strategy for publishing available parcel data for government to government data sharing.

FGDC Cadastral Data Subcommittee, *Parcel Management Program Business Plan Template, Version 1*, Internet, 2006, <http://www.nationalcad.org/showdocs.asp?docid=166&navsrc=Search&navsrc2=>

State Parcel Data Stewardship (2007)

Steps for the different levels of State data stewardship: A description of the Subcommittee's levels of stewardship by states that serve as a *trusted data source* for local government parcel data.

FGDC Cadastral Data Subcommittee, *State Stewardship for Parcel Data*, <http://www.nationalcad.org/showdocs.asp?docid=1013&navsrc=Report&navsrc2=>

National Land Parcel Data: A Vision for the Future (2008)

A visions and recommendations to develop a nationally integrated land parcel data infrastructure: National Land Parcel Data is an update the to the 1980 publication by the National Research Council, the Need of a Multipurpose Cadastre. This update looks at the current status (2008) of land parcel data in the United States. The book concludes that nationally integrated land parcel data is necessary, feasible, and affordable. It provides recommendations for establishing a practical framework for sustained intergovernmental coordination and funding required to overcome the remaining challenges and move forward.

Members of the Subcommittee participated on the Committee of Land Parcel Database and some of the Subcommittee's publications that are included in this annotated bibliography were used as references.

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Committee on Land Parcel Databases: A National Vision, Mapping Science Committee, National Research Council, *National Land Parcel Data: A Vision for the Future*, The National Academy Press, 2008, Internet, http://www.nap.edu/catalog.php?record_id=11978#description

Panel on a Multipurpose Cadastre, Committee on Geodesy, Assembly of Mathematical and Physical Sciences, National Research Council, *Need for a Multipurpose Cadastre*, National Academy Press, 1980, Internet, 2008, http://books.nap.edu/catalog.php?record_id=10989

Business Cases:

The Subcommittee conducted a number of assessments and workshops to define the business requirements for cadastral data. The objective of most of the efforts in this section was to determine how government agencies used cadastral data in their daily business operations and to refine the core data elements. This section provides important background information and references for the other sections.

Coastal Cadastral (2004)

A coastal cadastre for continuity: Coastal waters under United States jurisdiction are transitioning from a sparsely utilized environment of zone-based activities to a more highly used and impacted areas with an increasing number of place-based activities. Coastal resource managers are seeing increased pressures on commercial and recreational fishing while improvements in technology are allowing place-based businesses such as undersea mining, aquaculture, and wind and wave energy to increase in number and to extend further from shore. Effective strategies for managing coastal resources are dependent upon information, although currently it is difficult to share information between agencies because of inconsistencies in information management strategies. Methods that had been adequate for managing zone-based activities make it difficult to take full advantage of new technology that could greatly facilitate information exchange. The purpose of this assessment is to identify the principle information management issues in coastal waters, reconcile the different approaches and seek ways to build the missing cadastral infrastructure.

David Stage, *An Assessment of Best Practices for Managing Information on Rights and Leases in Coastal Waters*, FGDC Cadastral Data Subcommittee, August 2004, Internet, <http://www.nationalcad.org/showdocs.asp?docid=1004&navsrc=Search&navsrc2=>

Parcel Data and Hurricane Isabel: A Case Study (2004)

The value of parcel data for hurricane disaster response: A report of the importance of parcel data in emergency response. Information was collected as a part of a 2004 workshop in Raleigh, NC. Participants included individuals from local, state, and federal agencies that were part of Hurricane Isabel response and recovery effort.

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David Stage and Nancy von Meyer, *Parcel Data and Hurricane Isabel: A Case Study*, FGDC Cadastral Data Subcommittee, Internet, 2004,
<http://www.nationalcad.org/showdocs.asp?docid=86&navsrc=Search&navsrc2=>

Parcel Data and Wildland Fire Management (2005)

The value of parcel data for wildland fire disaster response: The Wildland Fire and Parcel Data Workshop was sponsored by the Subcommittee in response to policies and guidance issued by the Western Governors' Association and to national homeland security needs for all agencies to be prepared and responsive in emergencies. The purpose of this workshop was to:

Examine the business requirements of wildland fire management and the related need for parcel data in a multi-jurisdictional environment.

This was a follow up to a 2004 workshop in Raleigh, North Carolina (see *Parcel Data and Hurricane Isabel: A Case Study*).

David Stage, Nancy von Meyer and Bob Ader, *Parcel Data and Wildland Fire Management*, FGDC Cadastral Data Subcommittee, 2005, Internet,
<http://www.nationalcad.org/showdocs.asp?docid=149&navsrc=Search&navsrc2=>

The Energy Community and Cadastral Data (2006)

The value of parcel data for the energy community: A discussion of the need for accurate survey boundaries and land ownership information required by the energy community (exploration, production and reclamation), regulatory agencies and private individuals to provide decision support tools necessary to manage the life cycle of energy development from prospect to production. From the early stages of prospect identification through leasing, permitting, drilling, completion, production and marketing, land ownership rights and interests contribute to each step in this life cycle. Knowing who owns mineral rights, which local, tribal, state and federal regulations apply in an area and how to gain access to the drilling locations and development sites often hinges on surface and subsurface rights and interests.

Bob Johnson, Bob Ader, Nancy von Meyer, Stu Kirkpatrick, Mike Birtles and William Grayson, *The Energy Community and Cadastral Data*, FGDC Cadastral Data Subcommittee, 2006, Internet, <http://www.nationalcad.org/showdocs.asp?docid=171&navsrc=Search&navsrc2=>

The Uses of Cadastral Data by Federal Agencies (2008)

Federal agency use of parcel data: At the June 2008 meeting the FGDC Steering Committee Chair, James Cason, asked the Cadastral Subcommittee, Chaired by Bureau of Land Management (BLM) Cadastral Survey, to contact the thirty members of the FGDC Steering Committee to identify the uses and needs for cadastral data in each of the represented agencies. The project report includes in its appendix a one page summary of the uses of parcel data in each agency.

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FGDC Cadastral Data Subcommittee, *The Uses and Needs of Cadastral Data by Federal Agencies*, Internet, <http://www.nationalcad.org/showdocs.asp?docid=1043&navsrc=Report&navsrc2=>

Parcel Data for Hurricane Ike - Lessons Learned (2008)

Lessons learned after Ike: When it became apparent where Hurricane Ike was going to make land fall the US Forest Service (USFS) asked the Subcommittee to provide them with assistance for the acquisition of parcel data in those counties that were in the path of Ike and were in proximity to USFS lands. The data was being used to prepare the USFS's Emergency Funding Request that was submitted to the President and Congress and was passed by the House at the end of September 2008. The Subcommittee contacted each of the states and FEMA to ensure that efforts were not being duplicated. Informally the Subcommittee assumed the responsibility of coordinating the identification, acquisition and standardization of available parcel data in the impacted counties. This *lessons learned* document list some of the issues, problems and costs associated with searching for parcel data after a disaster event. This document provides an argument of pre-deploying the data so that it is in a ready to go format when a disaster strikes.

David Stage, Nancy von Meyer and Kevin Hyde, *Parcel Data for Hurricane Ike, Lessons Learned*, FGDC Cadastral Data Subcommittee, October 2008, Internet, <http://www.nationalcad.org/showdocs.asp?docid=1055&navsrc=Search&navsrc2=>

Cadastral Customers (2008)

Who is using the local government parcel data: For several decades, advancements in computing technology have allowed public agencies and private firms to create, migrate and maintain cadastral data in a digital format. As this information becomes more widely available, the cadastral information user base and business applications have also dramatically increased and broadened. The traditional customer base of real estate and assessment professionals now includes law enforcement, homeland security and a variety of private and commercial uses ranging from on-line home buying information to video games.

In an effort to better understand today's customers and market uses for cadastral information, the Subcommittee conducted an informal survey of state and local government cadastral data producers and managers. Interviewees were asked about their current cadastral data customer base, data content and format needs, customer tracking, product and service changes and observable trends. They were also asked if the FGDC cadastral standard was meeting current customer needs. Responses were focused on private sector customers and uses of cadastral data at the jurisdictional or regional level.

FGDC Cadastral Data Subcommittee, *Today's Cadastral Information Customers and Requirements*, Internet, 2008, <http://www.nationalcad.org/showdocs.asp?docid=1044&navsrc=Project>

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Inventories

There Subcommittees conducted two national inventories in 2003 and 2005 to assess the status a parcel modernization in the United States. The Subcommittee created an on-line county parcel data inventory in 2006 to assists with the acquisition of parcel data in thirteen Western states to assists with the US Forest Services wildland fire effort. The National States Geographic Information Council (NSGIC) created a GIS Inventory of all parcel data about the same time but it was not a sufficient level of development by the Subcommittee to use in the Wildland fire effort. Currently the Subcommittee and NSGIC have initiated an effort to improve the cadastral component of NSGIC's GIS Inventory to accommodate the needs of the Subcommittee and to serve as the single national inventory of cadastral data.

An Assessment of Parcel Data in the US - 2003 Survey Results (2003)

2003 Status of Parcel Data: A cadastral survey of all states and the District of Columbia was conducted between October, 2002 and February, 2003. This survey was part of the Subcommittee's efforts to test and evaluate a cadastral core data layer for the purpose of creating a design and implementation strategy for a national parcel database. The objective of this survey was to acquire a preliminary assessment of the number of parcels in the United States and the status of the conversion of parcel maps into a digital form. The survey was sent to each state GIS coordinator who had the appropriate person complete the questionnaire. The data provides a good estimate of the status of parcel data in 2003, but should not be considered definitive because some states were only able to partially respond to the survey and/or estimate numbers.

David Stage and Nancy von Meyer, *An Assessment Of Parcel Data In The United States*, FGDC Cadastral Data Subcommittee, Internet, 2993,
<http://www.nationalcad.org/showdocs.asp?docid=170&navsrc=Project>

An Assessment of Parcel Data in the US - 2005 Survey Results (2006)

2005 Status of Parcel Data: A cadastral survey in all fifty states and the District of Columbia was conducted from November 2005 through January 2006. This is the second national survey of the status of parcel data by the Subcommittee. The purpose of the survey was to assess the status of parcel conversion in the United States and identify trends using the 2003 survey as a base line.

David Stage and Nancy von Meyer, *An Assessment of Parcel Data in the United States*, FGDC Cadastral Data Subcommittee, 2005, Internet,
<http://www.nationalcad.org/showdocs.asp?docid=28&navsrc=Project>

National Cadastral Inventory (2008)

Cadastral Data Subcommittee Inventory: The FGDC Cadastral Data Subcommittee's hosts a website that includes and inventory of contacts and an inventory of local government parcel data. These web pages provide information related to the development, standards and implementation

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of the Cadastral National Spatial Data Infrastructure (NSDI). This site is the home for the Federal Geographic Data Committee (FGDC) Subcommittee for Cadastral Data and serves as a focus for coordinating national cadastral, parcel, and land records efforts. This site is the Subcommittee's production database for the publication of documents and its inventory of local government parcel data and cadastral contacts. The Subcommittee is working with NSGIC to migrate the county data to the *GIS Inventory* so that it serves as the national inventory of cadastral data.

FGDC Cadastral Data Subcommittee, Internet, 2008, <http://www.nationalcad.org/default.asp>

GIS Inventory (2008)

NSGIC GIS Inventory: Ramona is produced by the [National States' Geographic Information Council](#) (NSGIC) as a tool for states and their partners. Its primary purpose is to track the status of GIS data in US state and local governments to aid the planning and building of Spatial Data Infrastructures. Ramona is designed to work in concert with Geospatial One Stop (www.geodata.gov).

National States Geographic Information Council, GIS Inventory, Internet, 2008, <http://gisinventory.net/>