

FIG Young Surveyors North American Meeting



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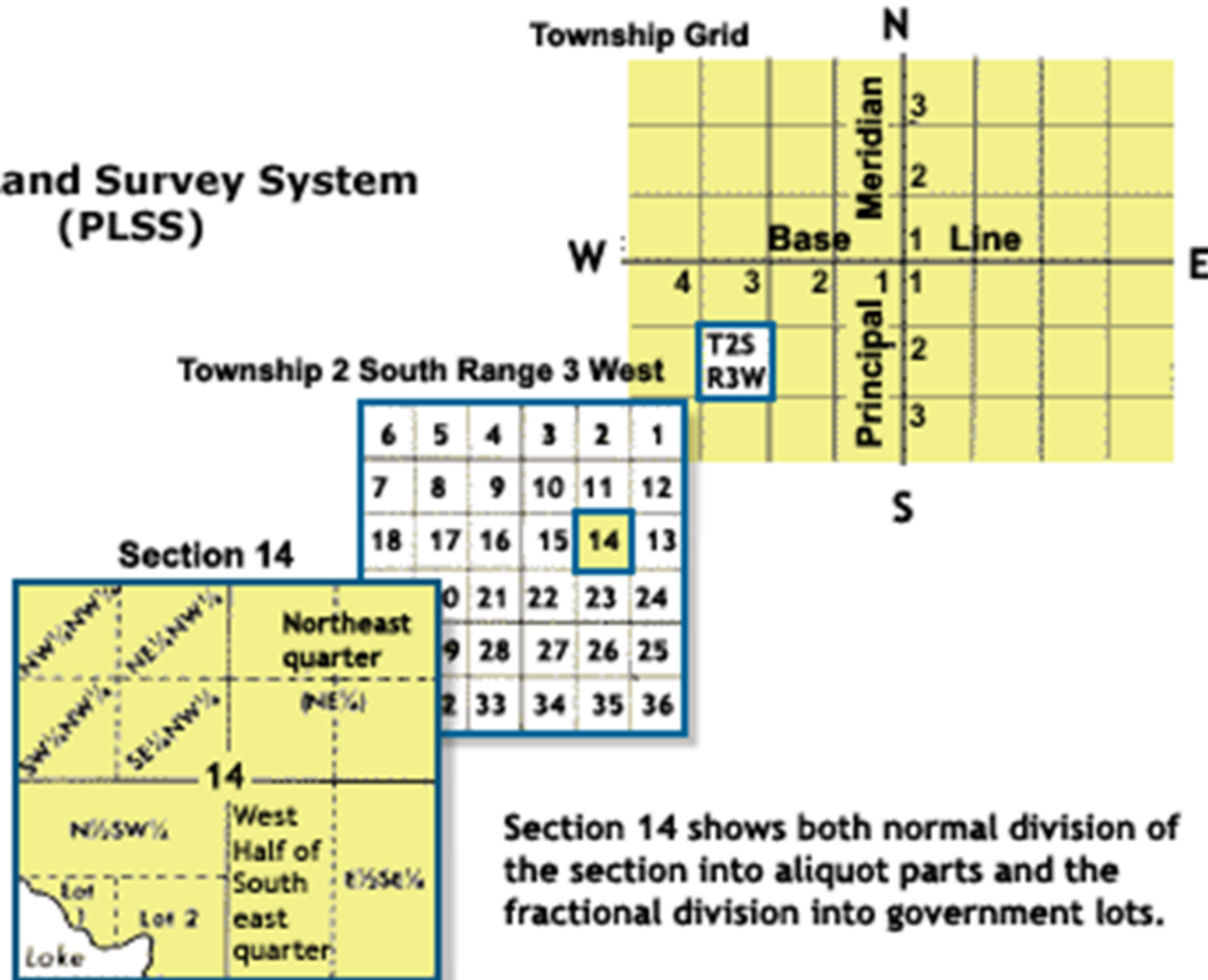
Topics and Activities

1. Cadastral - Public Land Survey System
2. Federal Geographic Data Committee
3. BLM Cadastral Related Activities
4. Land Buy-Back Program for Tribal Nations
5. Other activities



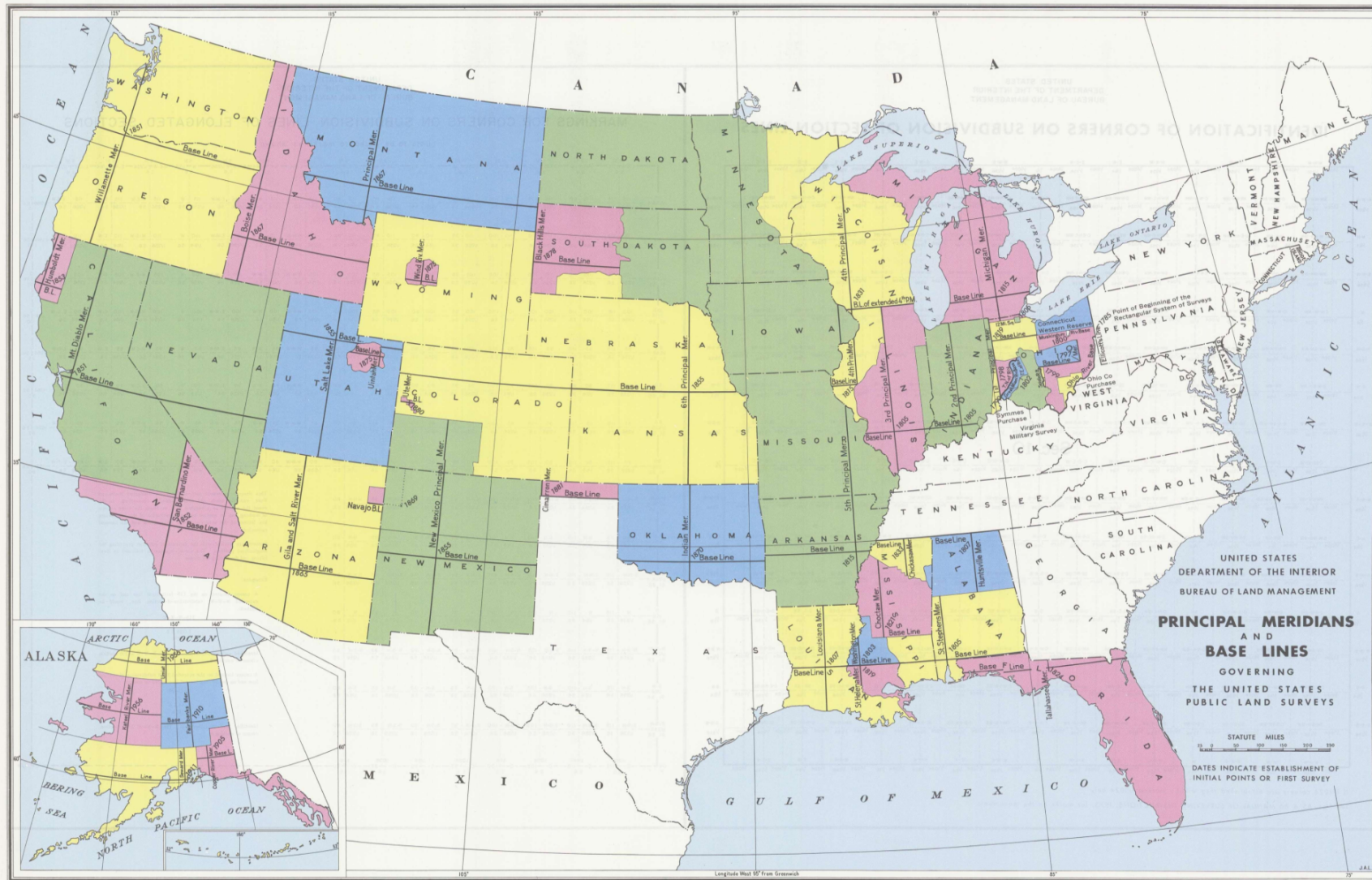
U.S. Rectangular Survey System

Public Land Survey System (PLSS)



Section 14 shows both normal division of the section into aliquot parts and the fractional division into government lots.

PLSS States









Federal Geographic Data
Committee
Cadastral Subcommittee



Federal Geographic Data Committee

Share On Social Sites

Google +

Twitter

Facebook

Dataset Extent



Map data CC-BY-SA by OpenStreetMap Tiles by MapQuest

PLSS_CadNSDI_V2 Standardized PLSS Data Catalog National Geospatial Data Asset (NGDA) Public Land Survey System (PLSS) Dataset Catalog

This catalog is a listing of the location of available standardized PLSS data sets which are hosted by BLM and states. The document referenced in the online linkage is updated regularly and will provide linkages for accessing state and BLM hosted sites. The PLSS Data are standardized for publication and are in compliance with the FGDC the Cadastral Publication Data Standard for the National Spatial Data Infrastructure or CadNSDI Version 2.0. This standard publication guideline for cadastral data and is intended to provide a common format, structure and content of the information and allow it to be readily used across jurisdictional boundaries. This data represents the GIS Version of the Public Land Survey System including both rectangular and non-rectangular survey data. The rectangular survey data are a reference system for land tenure based upon meridian, township/range, section, section subdivision and government lots. The non-rectangular survey data represent surveys that were largely performed to protect and/or convey title on specific parcels of land such as minerals surveys and tracts. The data are largely complete in reference to the rectangular survey data at the level of first division. However, the data varies in terms of granularity of its spatial representation as well as its content below the first division. Therefore, depending upon the data source and steward, accurate subdivision of the rectangular data may not be available below the first division and the non-rectangular minerals surveys may not be present. At times, the complexity of surveys rendered the collection of data cost prohibitive such as in areas characterized by numerous, overlapping mineral surveys. In these situations, the data were often not abstracted or were only partially abstracted and incorporated into the data set. These PLSS data were compiled from a broad spectrum or sources including federal, county, and private survey records such as field notes and plats as well as map sources such as USGS 7 1/2 minute quadrangles. The metadata in each data set describes the production methods for the data content. This data is optimized for data publication and sharing rather than for specific "production" or operation and maintenance. A complete PLSS data set includes the following: PLSS Fully Intersected (all of the PLSS feature at the atomic or smallest polygon level), PLSS Townships, First Divisions and Second Divisions (the hierarchical break down of the PLSS Rectangular Divisions) PLSS Special surveys (non rectangular components of the PLSS) Meandered Water, Corners and Conflicted Areas (known areas of gaps or overlaps between Townships or state boundaries). The Entity-Attribute section of this metadata describes these components in greater detail.

Data And Resources

PDF File
PLSS-CadNSDI-Data-Set-Availability.pdf

Download

PDF File
PLSS-CadNSDI-Data-Set-Availability.pdf

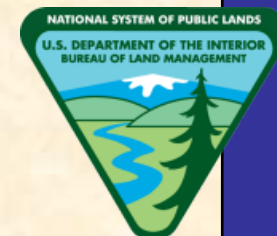
Download

Metadata Source

ISO-19139 Metadata
Download Metadata - View Full Metadata

Original FGDC Metadata
Download Original Metadata - View Original Full Metadata

Harvested from FGDC WAF (Hosted by DOI for Geoplatform.gov)



More information

FGDC Cadastral Subcommittee

Coordinating national cadastral and land records information



Welcome to the FGDC Cadastral Subcommittee outreach web site.

This site contains reports and standards from the Subcommittee as well as many local, state, and national cadastral topics and related standards.

The [About Us Page](#) includes links to the charter and annual reports, committee members, and recent meeting notes and agendas.

The [Subcommittee Standards and Guidelines](#) has the FGDC Cadastral Data Content Standard and the implementation standards, guidelines, and handbooks.

The Subcommittee Projects are business or applications areas where the Subcommittee has partnered with various organizations to define the needs and uses for cadastral data. These are arranged by topic area and include a project focused on state practices and business plans for state hosted parcel and PLSS data.

The [reference documents](#) and archives contain related documents that were not developed by the Subcommittee but may have been used as reference or are of interest to the cadastral community. This section also contains glossaries and inventories and archived reports that are no longer related to an active project or workgroup.

Check out the [What's New Page](#) for any recent or breaking news.

The [national parcel blog](#) has topics related to cadastral implementation. Please use the contact us link if you have any questions or suggestions.

Home

[What's New](#)

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[Projects](#)

[Reference Docs](#)

[External Links](#)

Contact Us

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FGDC

Public Land Survey System

- Cadastral Subcommittee and BLMs role for PLSS
 - BLM is the authoritative source for the PLSS data
 - Subcommittee/BLM facilitation and coordination
 - PLSS data publication through nationalcad.org
 - Other documents
 - Maintenance and updates



Public Land Survey System

- GIS Version including both rectangular and non-rectangular survey data
 - rectangular survey data are a reference system for land tenure based upon meridian, township/range, section, section subdivision and government lots
 - non-rectangular survey data represent surveys that were largely performed to protect and/or convey title on specific parcels of land such as minerals surveys and tracts
- Standardized PLSS data for the 30 Public Domain states. represent about 40 million parcels that provide the basis for parcel mapping, land governance decisions, and navigation of cadastral data in Public Domain states
 - <http://nationalcad.org/download/PLSS-CadNSDI-Data-Set-Availability.pdf>



FGDC Cadastral Subcommittee Activities

- Updates nationalcad.org
 - Outreach site redesigned for responsive viewing (mobile viewing)
 - Updated documents including adding a permanent link for documents.
 - Added documentation of standard domains of values for PLSS CadNSDI data sets.
 - Updated project reports.



Cadastral/BLM recent Activities

PLSS Data Sets

- Adopted Esri's Parcel Fabric for the PLSS data set maintenance platform
 - In area's of BLM authority – migrating to parcel fabric and establishing stewardship partnership Partners are importing to the Fabric
 - Maintenance within parcel fabric
 - Developed web based training – You Tube CadNSDI Channel
 - <https://www.youtube.com/channel/UChbhzk0rupEms6zHJehdFyg>
 - Consistent procedures for updates



PLSS data Maintenance tutorials

The screenshot shows the YouTube channel page for 'CadNSDI'. At the top, there is a search bar with 'CadNSDI' entered and a search icon. To the right of the search bar are 'Upload' and 'Sign in' buttons. Below the search bar is a banner image of a field of orange and yellow flowers. The channel name 'Cad NSDI' is displayed in the center, with a 'Subscribe' button showing 3 subscribers. Below the channel name are navigation tabs for 'Home', 'Videos', 'Playlists', 'Channels', 'Discussion', and 'About'. A dropdown menu for 'All activities' is visible. The main content area shows three video uploads from 'Cad NSDI' from 1 month ago. The first video is 'LSA Lesson 2' with 17 views and a duration of 23:12, titled 'Continuing Various Least Squares Adjustment of Polygons in the Parcel Fabric'. The second video is 'LSA Lesson 1' with 22 views and a duration of 18:11, titled 'Various Least Squares Adjustment methods of Polygons in the Parcel Fabric'. The third video is partially visible. On the right side, there is a 'Popular channels' section listing: SuperHeroFights, Comicstorian, ExplosmEntertainm..., TeamFourStar, Tianne King, and BeA Hero, each with a 'Subscribe' button. On the left side, there is a sidebar with navigation options: Home, BEST OF YOUTUBE (Popular on YouTube, Music, Sports, Gaming, Movies, TV Shows, News, Live, Spotlight, 360° Video), Browse channels, Sign in now to see your channels and recommendations! (with a 'Sign in' button), and YouTube Red.



Compiling Mineral Surveys

The screenshot displays a video player interface for a lesson titled "Compiling Mineral Surveys: Lesson 1". The main content area is split into two windows:

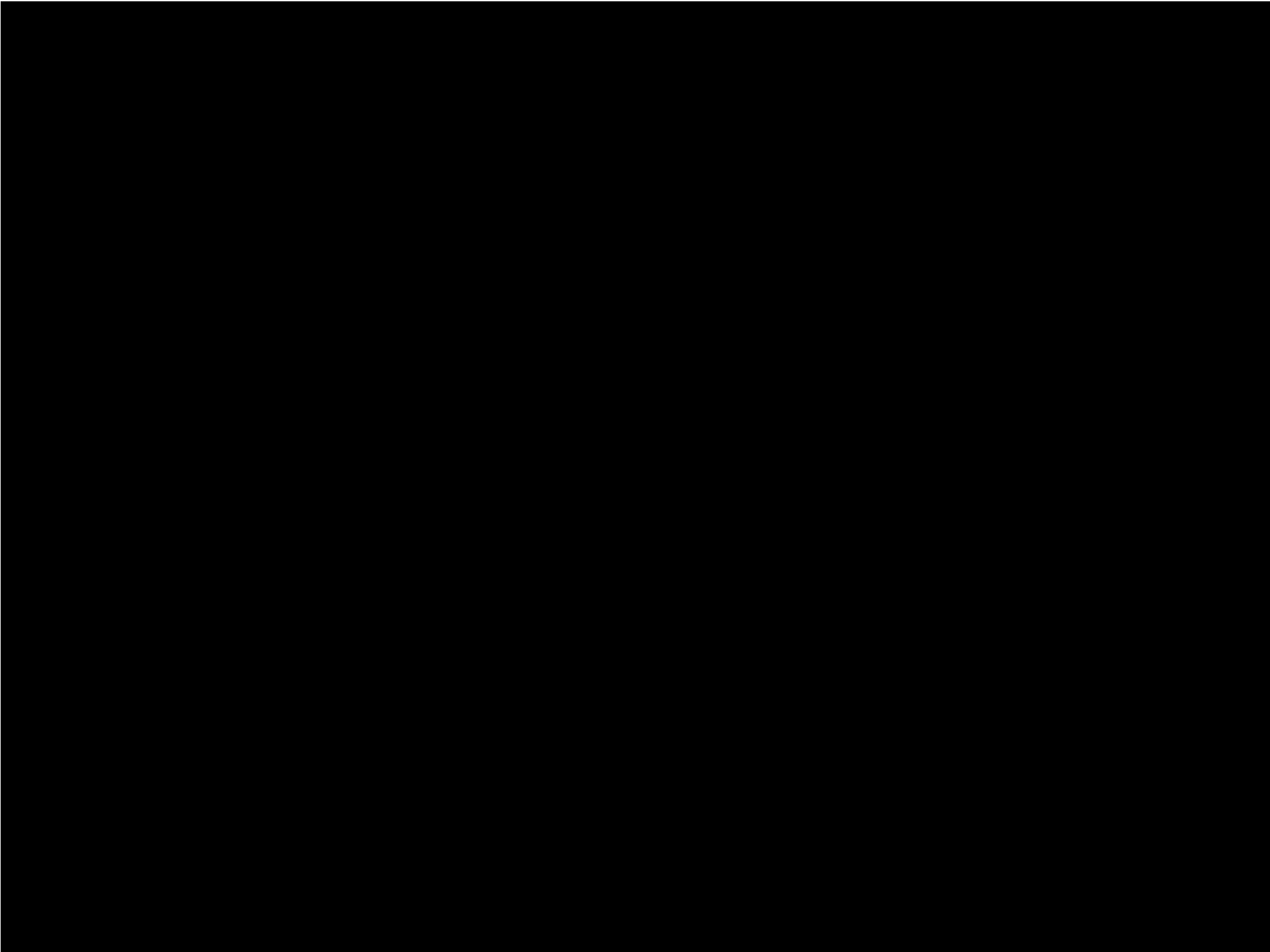
- Mineral Entry - ArcMap:** This window shows a map with a blue grid. A green shaded area represents a parcel, with labels "MS 2624" and "MS 3524" visible. A "Parcel Details" dialog box is open, showing a table for recording survey data.
- nms352401a.pdf - Adobe Acrobat Pro:** This window displays a historical survey plat. The plat includes a diagram of a rectangular parcel with various lines and bearings, and a text section on the right titled "PLAT" containing legal descriptions and signatures.

The video player controls at the bottom show a progress bar at 10:55 / 11:00, along with play, stop, and volume icons. A Creative Commons license icon and an HD logo are also visible.

Historical research

- BLM General Land Office Records
 - Genealogy
 - Natural Resource baseline data
- United States Land Patents, 1788-2012
 - <https://www.youtube.com/watch?v=Uo0UPWhGYG0&authuser=0>







U.S. Department of the Interior



Land Buy-Back Program for Tribal Nations

[Home](#)

[The Program](#)

[Tribes](#)

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Land Buy-back Program for Tribal Nations

- *Cobell* Settlement
 - Implements the land consolidation
 - Provided \$1.9 billion to purchase fractional interests from willing sellers at fair market value
 - Consolidated interests for uses benefiting the reservation community and tribal members
 - Approximately 245,000 owners of nearly three million fractional interests are eligible to participate in the Buy-Back Program.



BLM Cadastral Related Activities Land Buy-Back Program for Tribal Nations

- Completing records analysis, boundary updates and reports
 - There are over 300 land based Indian reservations
 - In FY 2015 over 80 buy back reservations will be mapped for records improvement, land descriptions, location and appraisals.
 - BY FY 2016 over 153 buy back reservations will be completed.
 - Purchase of 1.48 million acres for \$725 million (11/27/2015)



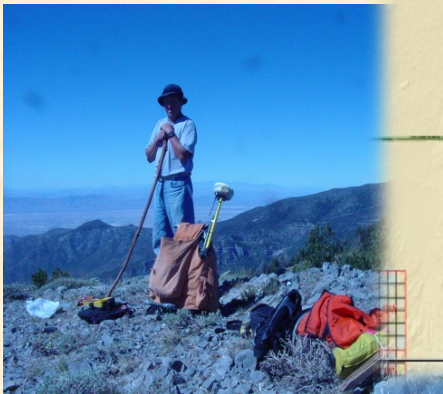
Land Buy-back Program for Tribal Nations

PLSS Corner Collection
Premier Data Services

PointID	Section	Corner	Distance	Relay	Reliance	PointType	MonumentType	MonumentStatus	Comment	CollectionStatus	DistanceMeters	XBegin	YBegin	ZBegin	ModifiedBy	GPSTime	AgeDays	AgeAcc	AgeHOP	AgePOOP	AgePPOOP	AgeMPOOP	PPPercent	PPMagAcc	PPMagVcc	Notes
10152	10	SE	10.00	10.00	100	Section Corner	Iron Post	Collected		Collected	2.5	-107.30815735	34.67002005	1715.620458	joesolomon	02/20/10 7:42:20 AM	0	6.226267	2.074133	2.074133	3.940099	3.940096	100	0.648332	0.4	New Mexico Corner Photo

Modify

YCOORD: 34.669967
ZCOORD: 0
ERRORX: 50
ERRORY: 10
ERRORZ: 0
RELY: 50
PointTypeID: Section Corner
MonumentTypeID: Brass Cap on Iron Post
MonumentStatusID: Fair
Comment:
CollectionStatus: Collected
DistanceMeters: 2.5
XBegin: -107.30815735
YBegin: 34.67002005
ZBegin: 1715.620458
ModifiedBy: joesolomon
GPSTime: 02/20/10 7:42:20 AM
AgeDays: 0
AgeAcc: 6.226267
AgeHOP: 2.074133
AgePOOP: 2.074133
AgePPOOP: 3.940099
AgeMPOOP: 3.940096
PPPercent: 100
PPMagAcc: 0.648332
PPMagVcc: 0.4
New Mexico Corner Photo



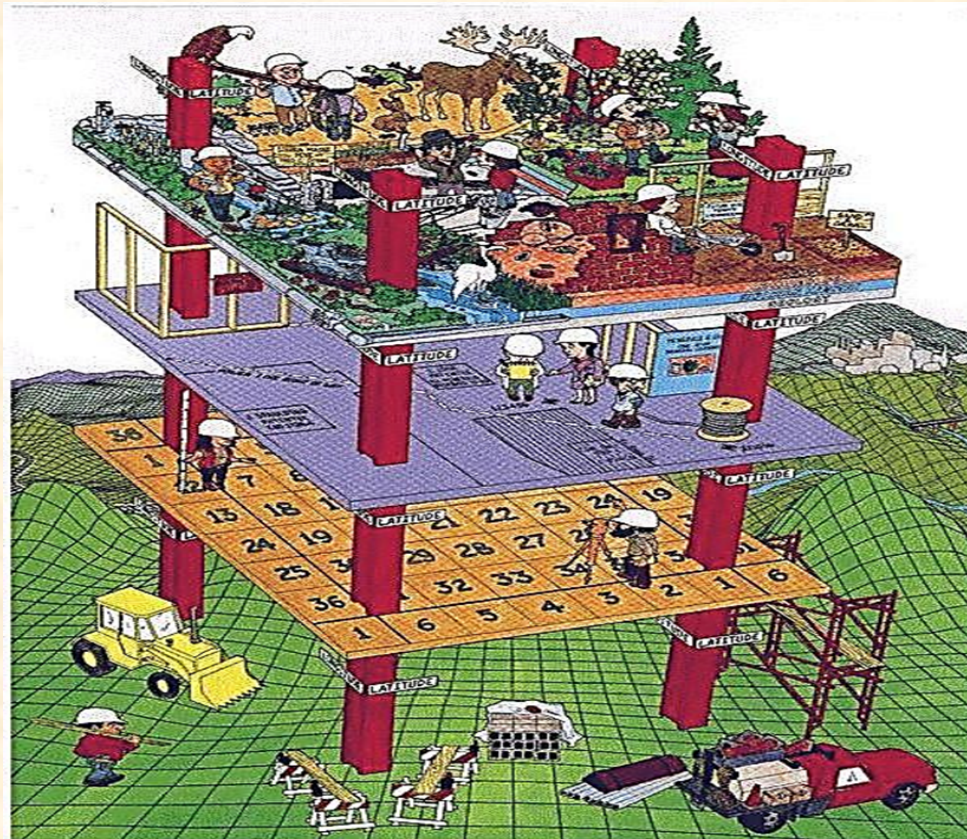
Requirements/Goals

-to meet the specialized needs of federal government appraisers to accurately position assets and resources relative to parcel boundaries to determine valuations.
-using data or information contained in federal databases or other systems and which are derived from official records.
-data/information from an authoritative sources. (TAAMS and the CadNSDI)
-to derive the Indian tract/parcel boundaries, enabling the mapping of both the surface and mineral estate, and register them to real world coordinates using the CadNSDI/PLSS framework
-to achieve a “one to one” geospatially, congruent match between the “Ownership” of TAAMS data and the “Possessory” or CadNSDI data for all parcels.



Expectations!

Achieve congruency between authoritative data sets in order to gain positional confidence in boundary location relative to title data and resources/assets information.



Deliverables

- Reservation-wide Parcel Geodatabases
- Improved PLSS corner positioning
- Improved records management of authoritative source databases
- Specialized GIS and records training for Tribal Reps.
- Full Documentation of the “Mapping Process.”
- Land characteristics data bases, web viewer, and map services for appraisal purposes



Value added features!

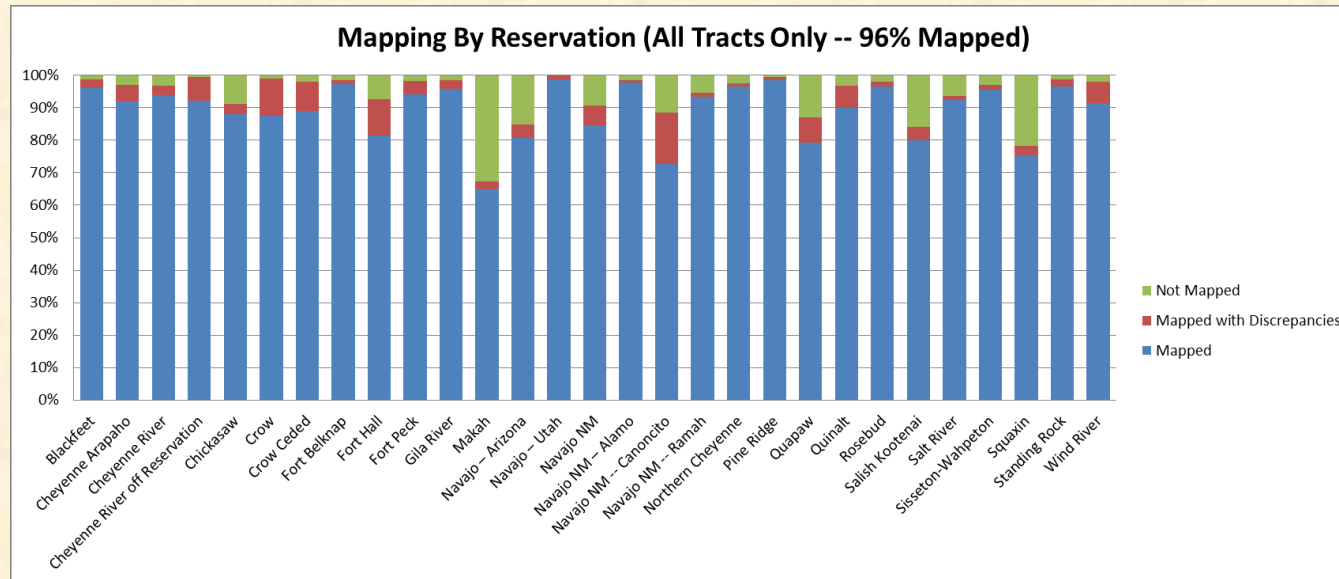
- Provided a uniform mapping product for all reservations; a standard...what a concept!
- BIA has adopted the process and methodology
- All data is made available to the individual tribes
 - Instant GIS for those who have none!
- A success story in collaboration, coordination, and cooperation between disparate federal agencies
 - Secretary of the Interior, Office of Appraisal Service, Bureau of Indian Affairs, Office of Special Trustee for American Indians, Bureau of Land Management, and Indian Tribes



Sample of mapping achievements

29 reservations

(blue is good!)



Statistics/Information

- Mapping Team (led by the BLM) includes BIA, OST, OAS, DME, and OS
- Over 80 reservations serviced (mapped and remapped); target is 153
- All reservations will have been mapped at least once by September 30, 2016.
- Program in year three; expected to end in 2022
- Over **4000** townships containing over **500,000** parcels serviced to date and **46 million** acres;)



An aerial photograph of a large body of water, possibly a lake or reservoir, with a forested shoreline. The water is a deep blue color, and the shoreline is a mix of green and brown. The text is overlaid on the image.

CADASTRAL AERIAL AND TERRESTRIAL MAPPING PROJECTS

Geometric calculation and georeferencing using Structure
from Motion (SfM) technology

Created by: Seth Kiester, Field Surveyor, BLM

STRUCTURE FROM MOTION TECHNOLOGY

Structure from Motion is the term used to describe a recently developed photogrammetric processing method which has many benefits and uses for geoscience applications. The technology is user-friendly, cost effective, and delivers high-accuracy (inches) results comparable to airborne LIDAR.

SfM is based on the same basic principles as stereo-pair photogrammetry, requiring a series of overlapping images and some form of precise control to create georeferenced (related to real world coordinates) products. Unlike traditional stereo pair photogrammetry, SfM does not require an extensive network of ground control points or a large expensive photogrammetric mapping camera. Using texture matching and a highly redundant bundle adjustment, this technology is able to solve for lens distortion parameters, camera positions, and ground object positions simultaneously and automatically. Real world coordinates can be determined with aerial GPS and a consumer grade D-SLR camera can be used to collect images. Cadastral has been working with and advancing this mapping technique in Alaska for the past 4 years.

Structure from Motion (SfM)

- Photogrammetric processing method for geoscience applications
- Cost effective, and delivers high-accuracy results comparable to airborne LIDAR
- Basic principles as stereo-pair photogrammetry, requiring a series of overlapping images
- Using texture matching and a highly redundant bundle adjustment
- Real world coordinates can be determined with aerial GPS and a consumer grade D-SLR camera can be used to collect images
- Advancing this mapping technique in Alaska for the past 4 years
Many application

WIDE ARRAY OF PLATFORMS AND CAMERA SYSTEMS ALLOWS MISSION FLEXIBILITY



JOHNSON RIVER IMAGE COLLECTION FLIGHT

USER CONTROLS CAMERA VARIABLES IN REAL TIME VIA WIRELESS LINK TO I-PAD



FIELD SURVEYS COST REDUCTION 2014

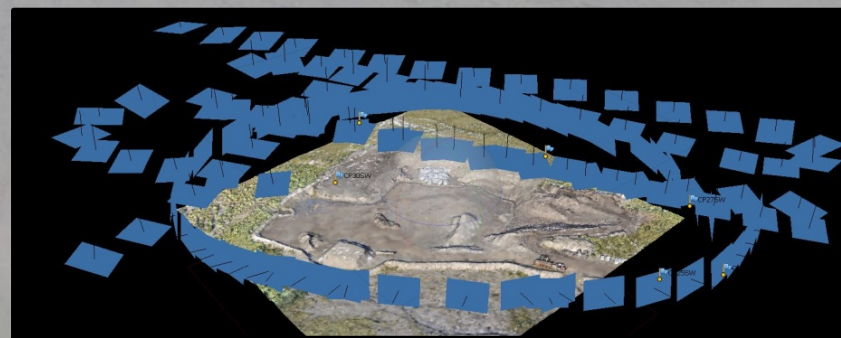
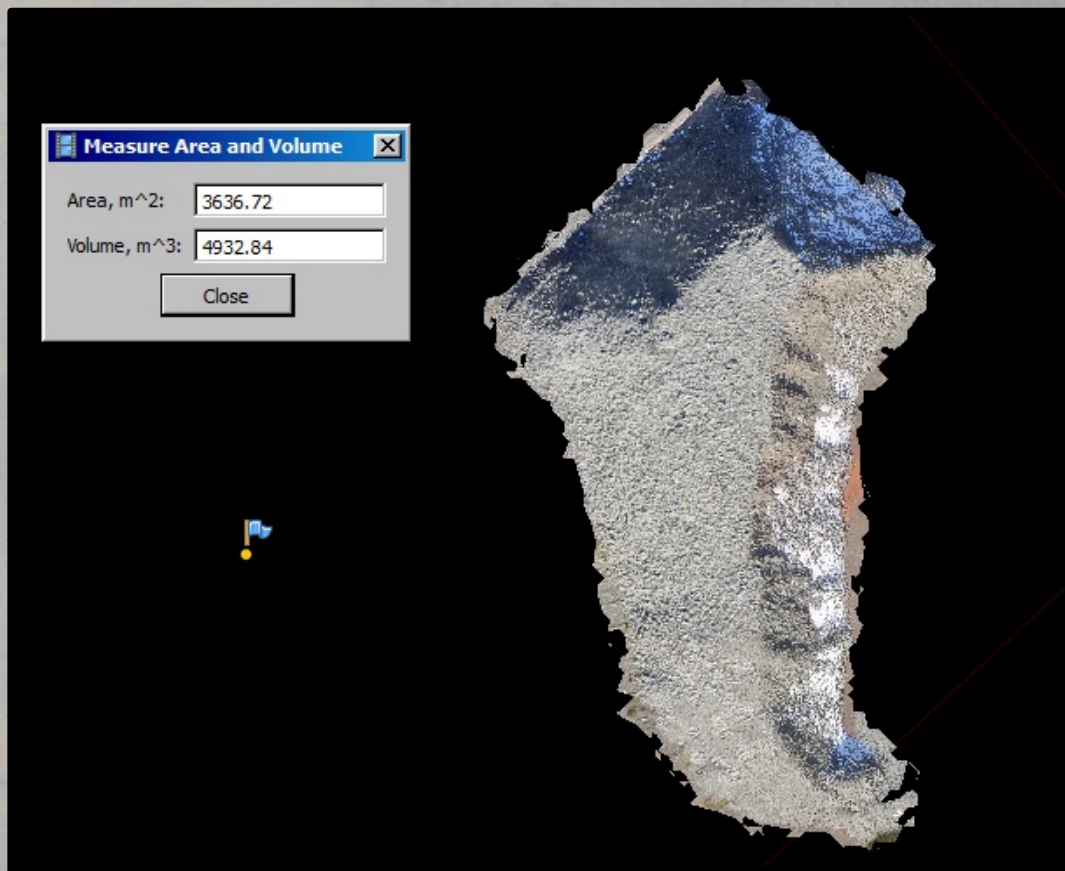
- SfM method
 - Collected meander (water boundary) data for water segregation
 - Four state and native corporation selections
 - Over 500 miles of riverbank and coastline
 - 42 flight hours

Traditional method uses a GPS receiver mounted on a helicopter to meander lakes, rivers, and coastline. SfM allows the use of a small fixed wing which is significantly more time and cost effective.

- Estimated cost reduction for 2014: \$200,000

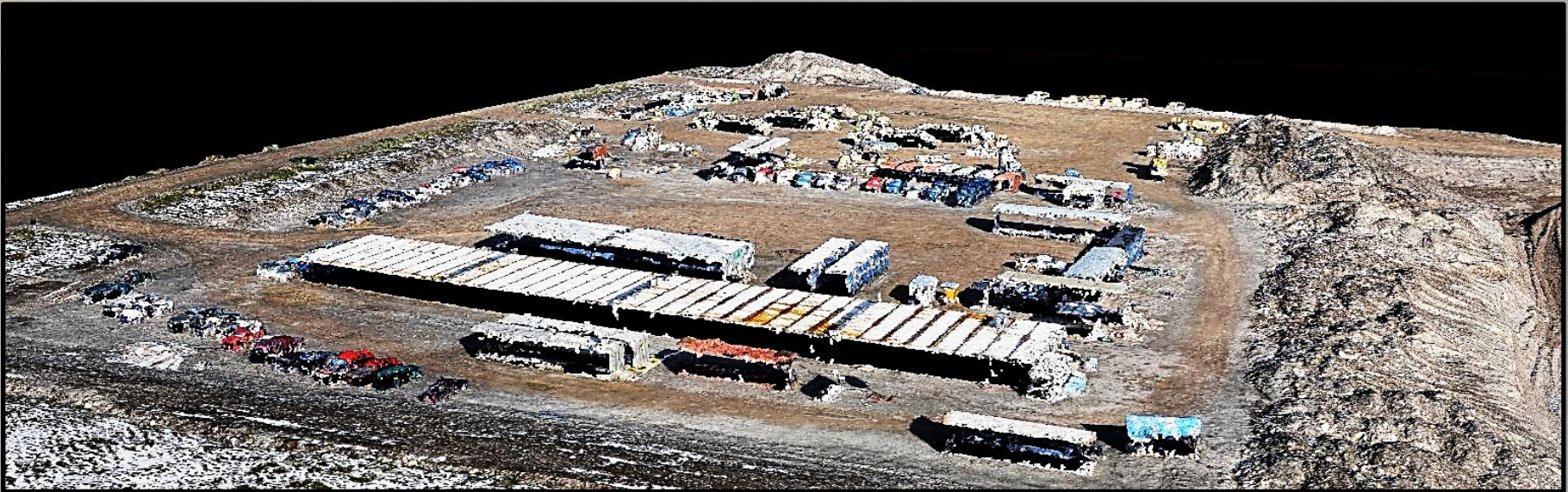


AREA AND VOLUME CALCULATION

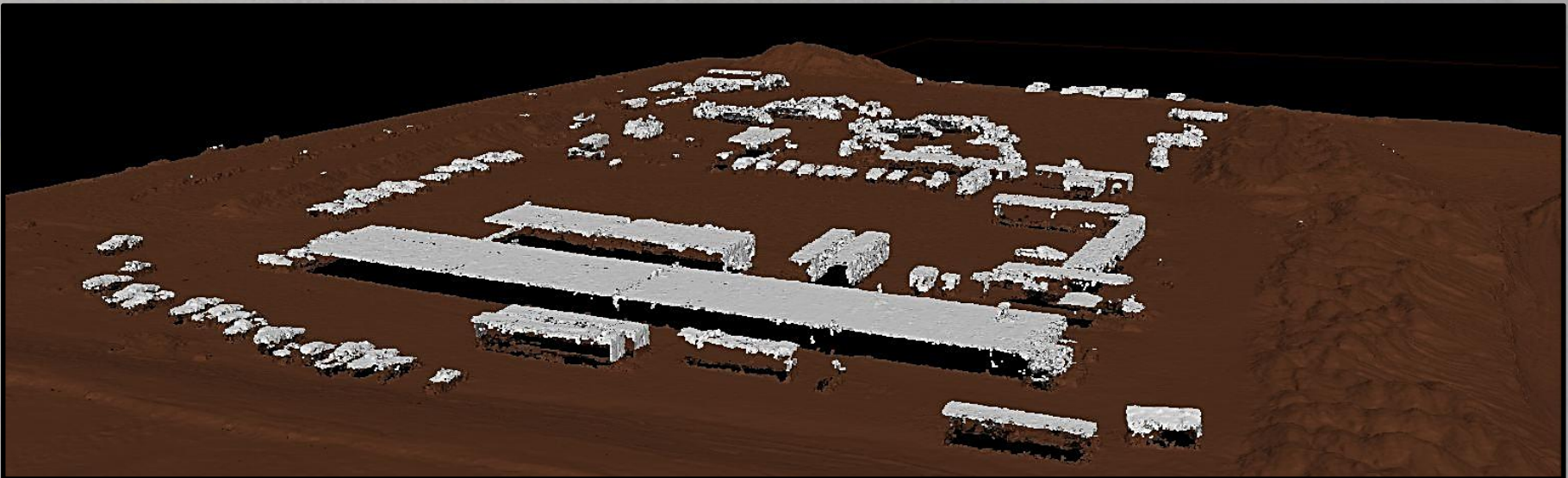


Haul Road BLM gravel pits near Pump Station 4. Images collected at varying heights to calculate gravel pit area and volume for usage assessment.

DENSE POINT CLOUD EDITING AND CLASSIFICATION

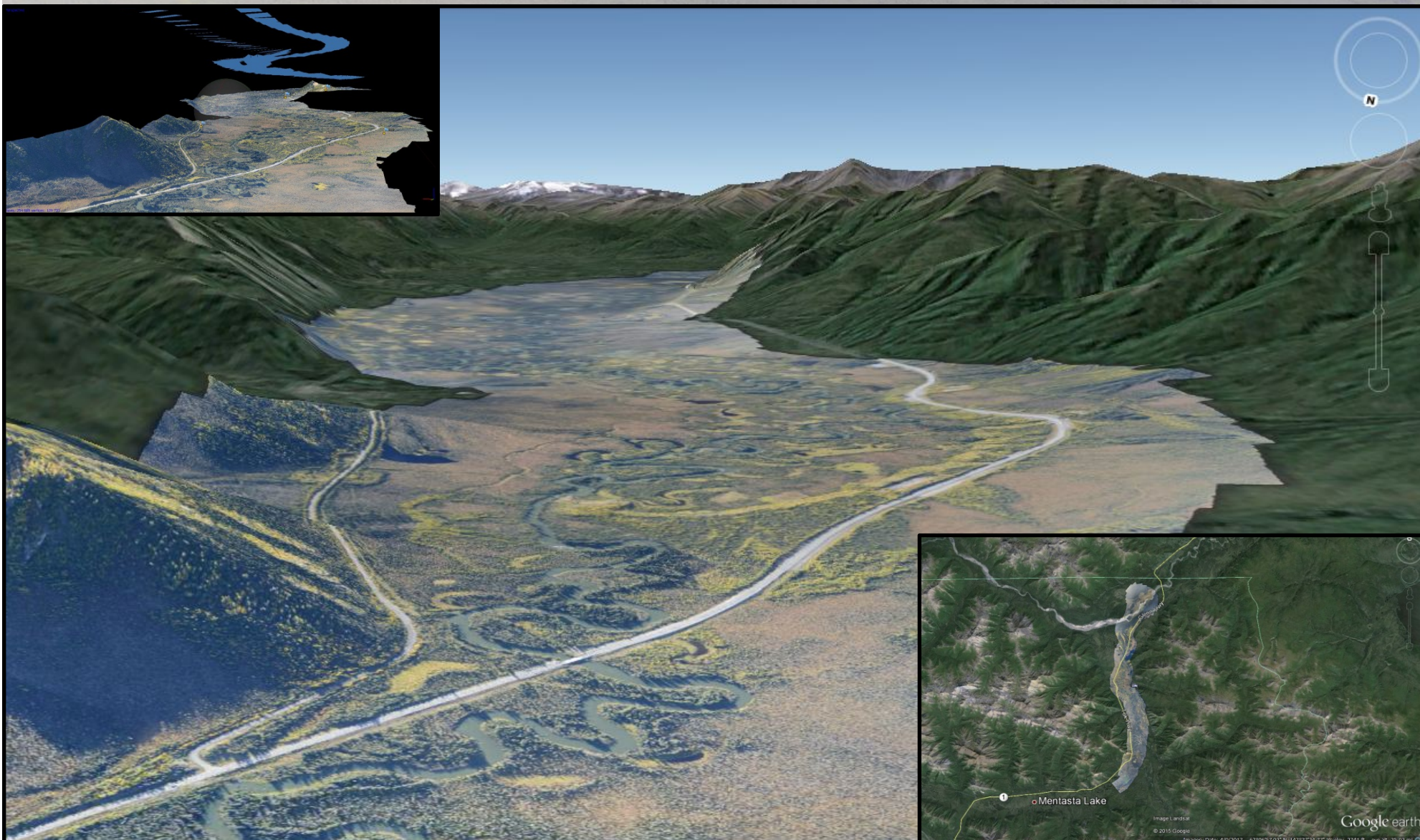


Galbraith Lake State Gravel Pit, AK. Dense point cloud with true color.



Dense point cloud classified by ground points/non-ground points.

HIGH RESOLUTION IMAGERY SHOWN IN GOOGLE EARTH



Information

- www.blm.gov/cadastral
- www.glorecord.blm.gov
- www.cfeds.org

