



2016  
Spring Bi-Annual  
**IGC** Meeting

*June 14, 2016*



# UAS in the Geospatial Industry

Chase Fly

UAS Team Coordinator

Electronic Data Solutions

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# Rules and Regulations



**Unmanned Aircraft Systems**

- [News](#)
- [FAQs](#)
- [Public Operations \(Governmental\)](#)
- [Civil Operations \(Non-Governmental\)](#)
- [Model Aircraft Operations](#)
- [Small UAS Notice of Proposed Rulemaking \(NPRM\)](#)
- [UAS Registration](#)
- [No Drone Zone](#)
- [Law Enforcement Resources](#)
- [Key Initiatives](#)
- [Regulations & Policies](#)
- [Publications](#)
- [Public Events](#)
- [About Our Office](#)
- [Temporary Flight Restrictions](#)

→ [FAA Home](#) • [Unmanned Aircraft Systems](#)

## Unmanned Aircraft Systems



**FAA Releases Drone Registration Location Data**

Searchable database lets anyone find the city, state, or zip code of registered owners.



Unmanned aircraft systems (UAS) are inherently different from manned aircraft. Introducing UAS into the nation's airspace is challenging for both the FAA and aviation community, because the U.S. has the busiest, most complex airspace in the world. The FAA is taking an incremental approach to safe UAS integration.

**What Can I Do with my Model Aircraft?**

UAS come in a variety of shapes and sizes and serve diverse purposes. Regardless of size, the responsibility to fly safely applies equally to manned and unmanned aircraft operations. The FAA is partnering with several industry associations to promote safe and responsible use of unmanned aircraft. Read more about the [Know Before You Fly](#) educational campaign.

**Different Types of UAS Operations**

- [Public Operations \(Governmental\)](#)
- [Civil Operations \(Non-Governmental\)](#)
- [Model Aircraft \(Hobby or Recreation only\)](#)

 Print
  Share

 Subscribe

**Top Tasks**

[Read about the draft rule for small UAS](#)  
[View FOIA Responses](#)  
[Apply for a Section 333 exemption](#)  
[Connect with a UAS Test Site](#)  
[Contact the UAS Integration Office](#)

**What can you do with your unmanned aircraft?**




**B4UFLY**  
 Smartphone App



# 3 Categories of UAS Operations

Public (Governmental)

Civil (Non-governmental)

Model Aircraft (Hobby or Recreation *only*)

[www.faa.gov/uas/](http://www.faa.gov/uas/)



# What is commercial use?

Revenue-generating

Non-revenue-generating

Incidental to business

May apply to some government operations

Check with the FAA or legal counsel!



# Public Operations

Requires Certificate of Authorization or Waiver (COA)

May require Class 2 Medical

May require passing grade on FAA ground exam

Letter from attorney general confirming you are government

Public aircraft

No commercial purpose

400 ft AGL max



# Civil Operations

Section 333 exemption

COA

Requires licensed pilot

File NOTAM 24-72 hours prior to flight operations

400 ft AGL max



# COA

Required for both public and private

Blanket COA under 400 ft AGL

Somewhat streamlined process

Site/location specific

Aircraft specific

Unmanned aircraft must be registered

Organization specific

May include special provisions

Monthly reporting to FAA





Federal Aviation  
Administration

New Account

Login



# Welcome to the Small Unmanned Aircraft System (sUAS) Registration Service

This site will allow you to register your small UAS  
with the FAA and update your registration.

REGISTER

LEARN MORE

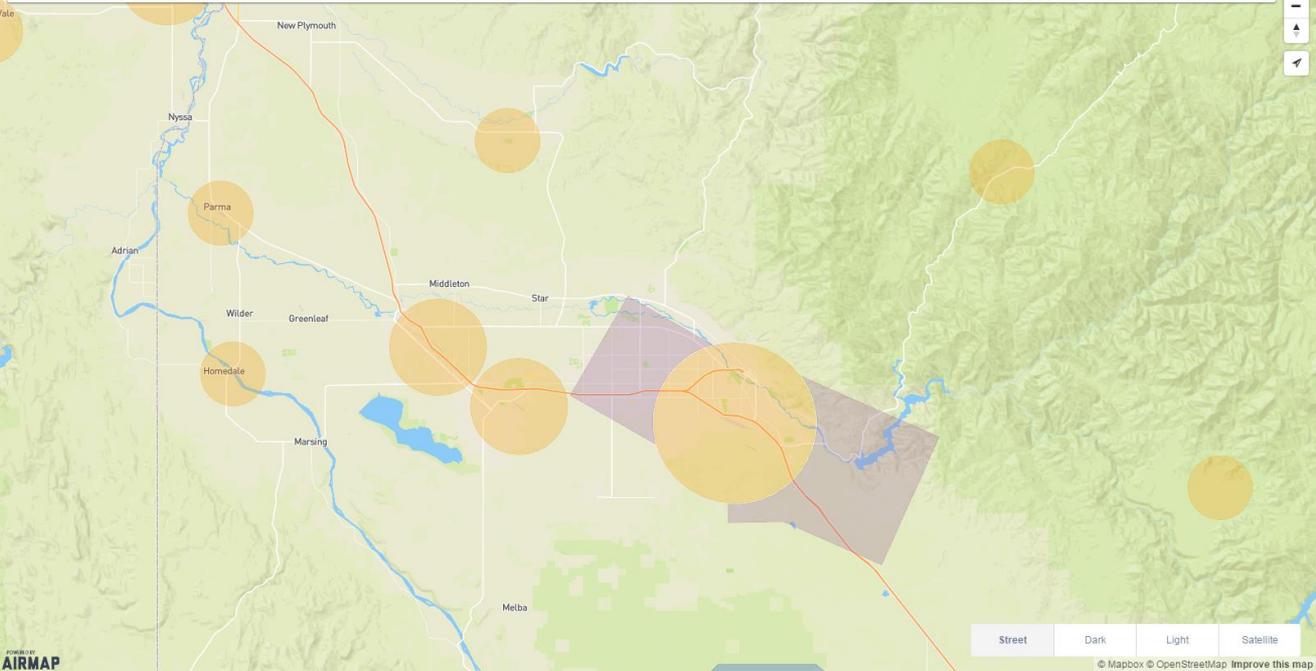


## Do I need to register my Unmanned Aircraft?

You need to register your aircraft if it weighs between **0.55 lbs.**  
(250 grams) and up to **55 lbs.** (25 kg)



**AIRMAP**
LOGIN



Commercial - Blanket COA
⌵

**Controlled Airspace** All | None ⌵

- Class B Airspace
- Class C Airspace
- Class D Airspace
- Class E Airspace

Which of these applies to my operation?

**Caution** ⌵

- Temporary Flight Restrictions
- Prohibited Special Use Airspace
- Restricted Special Use Airspace
- National Parks
- NOAA Marine Protection Areas

**Advisory** ⌵

- Hospitals
- Schools
- Heliports
- Power Plants

Comments and Feature Requests

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Share 108 Tweet

Street Dark Light Satellite

© Mapbox © OpenStreetMap Improve this map





## Overview of Small UAS Notice of Proposed Rulemaking

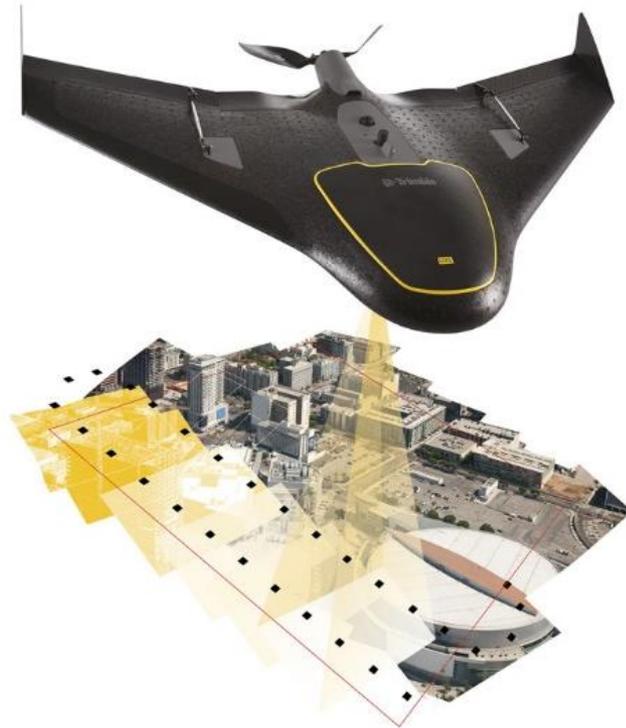
| <b>Summary of Major Provisions of Proposed Part 107</b>                  |  |
|--|--|
| The following provisions are being proposed in the FAA's Small UAS NPRM. |  |
| <b>Operational Limitations</b>   | <ul style="list-style-type: none"> <li>• Unmanned aircraft must weigh less than 55 lbs. (25 kg).</li> <li>• Visual line-of-sight (VLOS) only; the unmanned aircraft must remain within VLOS of the operator or visual observer.</li> <li>• At all times the small unmanned aircraft must remain close enough to the operator for the operator to be capable of seeing the aircraft with vision unaided by any device other than corrective lenses.</li> <li>• Small unmanned aircraft may not operate over any persons not directly involved in the operation.</li> <li>• Daylight-only operations (official sunrise to official sunset, local time).</li> <li>• Must yield right-of-way to other aircraft, manned or unmanned.</li> <li>• May use visual observer (VO) but not required.</li> <li>• First-person view camera cannot satisfy "see-and-avoid" requirement but can be used as long as requirement is satisfied in other ways.</li> <li>• Maximum airspeed of 100 mph (87 knots).</li> <li>• Maximum altitude of 500 feet above ground level.</li> <li>• Minimum weather visibility of 3 miles from control station.</li> <li>• No operations are allowed in Class A (18,000 feet &amp; above) airspace.</li> <li>• Operations in Class B, C, D and E airspace are allowed with the required ATC permission.</li> <li>• Operations in Class G airspace are allowed without ATC permission</li> <li>• No person may act as an operator or VO for more than one unmanned aircraft operation at one time.</li> <li>• No careless or reckless operations.</li> <li>• Requires preflight inspection by the operator.</li> <li>• A person may not operate a small unmanned aircraft if he or she knows or has reason to know of any physical or mental condition that would interfere with the safe operation of a small UAS.</li> <li>• Proposes a microUAS option that would allow operations in Class G airspace, over people not involved in the operation, provided the operator certifies he or she has the requisite aeronautical knowledge to perform the operation.</li> </ul> |
| <b>Operator Certification and Responsibilities</b>                       | <ul style="list-style-type: none"> <li>• Pilots of a small UAS would be considered "operators".</li> <li>• Operators would be required to:               <ul style="list-style-type: none"> <li>○ Pass an initial aeronautical knowledge test at an FAA-approved knowledge testing center.</li> <li>○ Be vetted by the Transportation Security Administration.</li> </ul> </li> </ul>  |



# Impacts on Geospatial Applications



# Photogrammetry and Aerial Survey

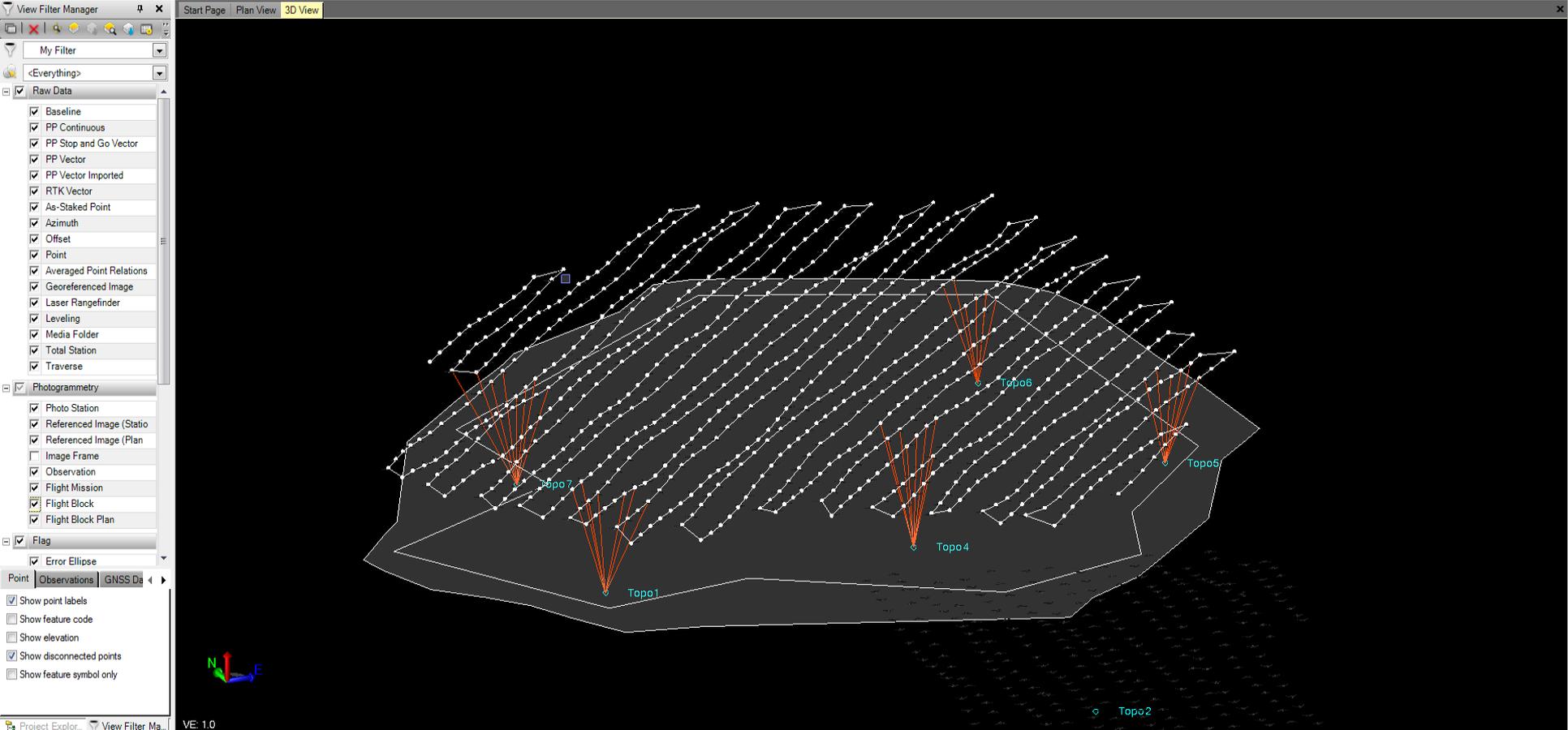


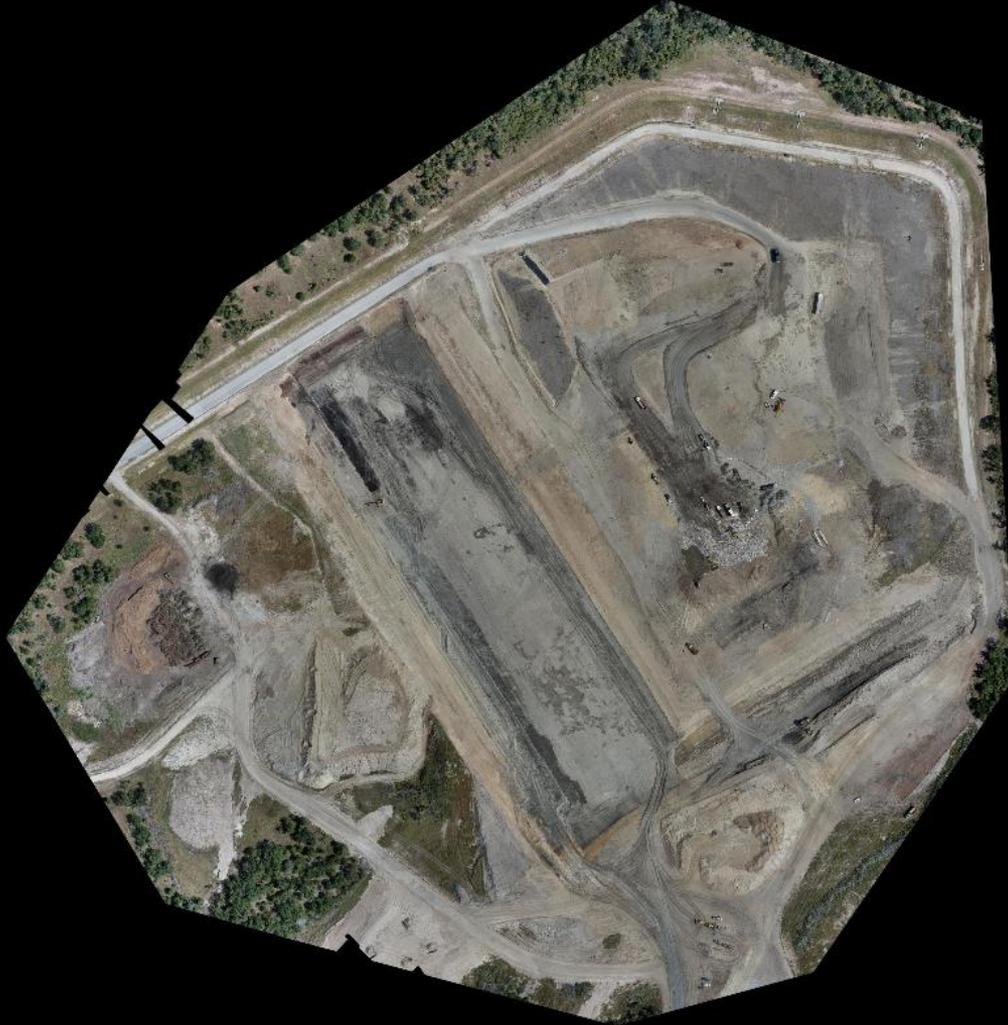
File Home View Data Survey CAD Edit Surfaces Corridor Drafting Photogrammetry Point Clouds Machine Control Support

Manager Project Explorer Command Pane Points Plan View 3D View Activate Limit Box Station View Surface Slicer View Google Earth 3D Drive View Cross-Section View Profile View Superelevation Diagram Alignment Views Toggle Line Marking Coordinate Scroll Toggle

New Vertical Tab Group Move to Next Tab Group Move to Previous Tab Group Windows

New Horizontal Tab Group







Georeferenced Image : Twin Oaks Block A.Ortho\_3.tif [0]





# GIS and Mapping

Background

Modeling and analysis

Feature extraction

Route planning

Remote sensing

Vegetation classification



# Engineering and Survey

Volumetrics

Topographic surveys

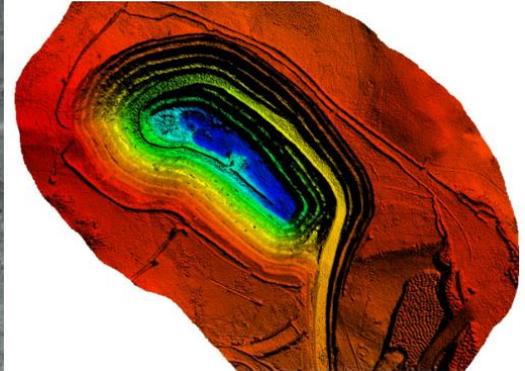
Design

Feature extraction

Site surveys

As-builts

Inspections



# Industries

Natural resources

Environmental

Agriculture

Archaeology

Forestry

Solid waste

Mining

Oil and Gas

Wildlife

Ecology

Vegetation

Range

Fire

Noxious weeds

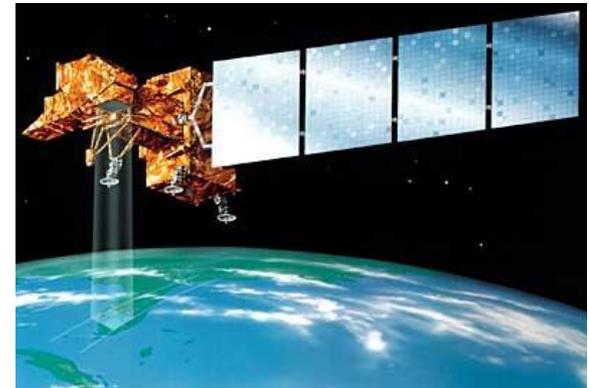
Transportation

Disaster relief



# Manned Flights and Satellites

Large scale projects  
Low resolution  
Expensive  
Weather dependent  
Time lag for data delivery



# Challenges for UAS

Large scale projects

Urban areas

Near airports

Over crowds

Large sensors

Beyond visual line of sight

Privacy concerns



# Current UAS Technology









**DroneDeploy**



**Trimble Business Center**  
Aerial Photogrammetry module



## Bottom Line

Lots of available systems

Sensors are getting smaller and better

Drones are getting cheaper

But there's more to it than just the UAS

# It's all about the data!



# Costs and Considerations for Commercial UAS Operations

Which UAS?

Sensor

Data processing software

333/COA

Pilot license

Insurance and liability

Privacy

Hire a service provider?



## Things to consider

Lots of hype and fun

It's not just about the drone, that's the cheap part

Not all sensors and airframes are happily married yet

COTS systems offer the simplest work flows

# Where should your time be spent?



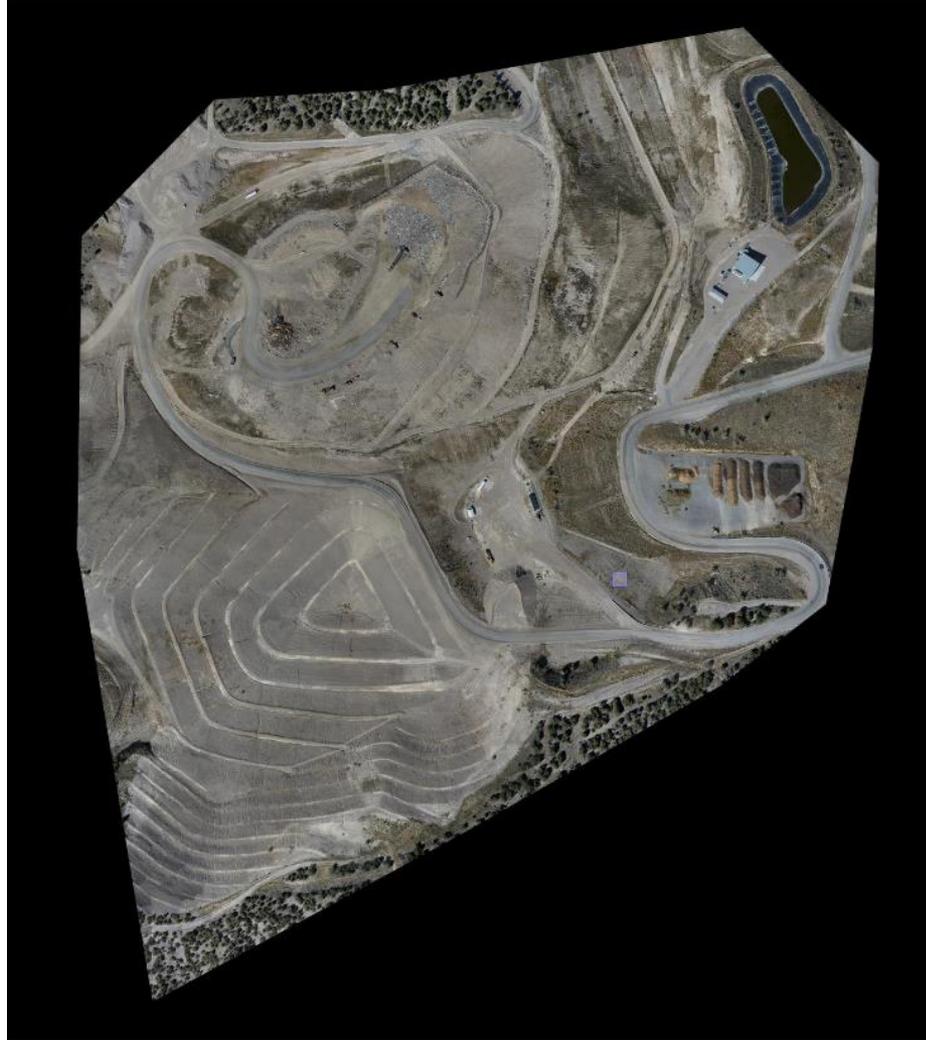
# Standard Data Outputs

Georeferenced orthomosaic aerial imagery

Digital surface models

Point clouds





Command Pane

Points  
Plan View  
3D View  
Top  
3D Projection  
Activate Limit Box  
Station View  
Surface Slicer View

Graphic Views

3D View Settings  
Process View  
Google Earth  
Defined Views  
Presentation Mode

Alignment Views

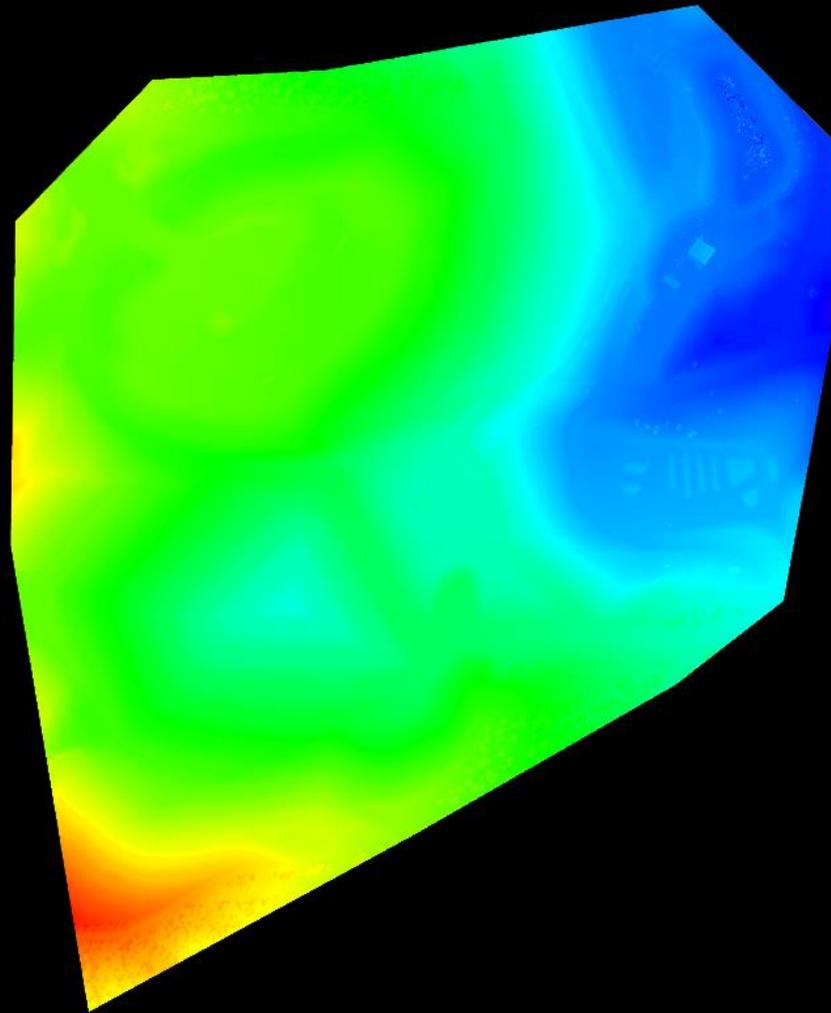
Cross-Section View  
Profile View  
Superelevation Diagram

Toggle  
Toggle Gridlines  
Toggle Line Marking  
Coordinate Scroll

Windows

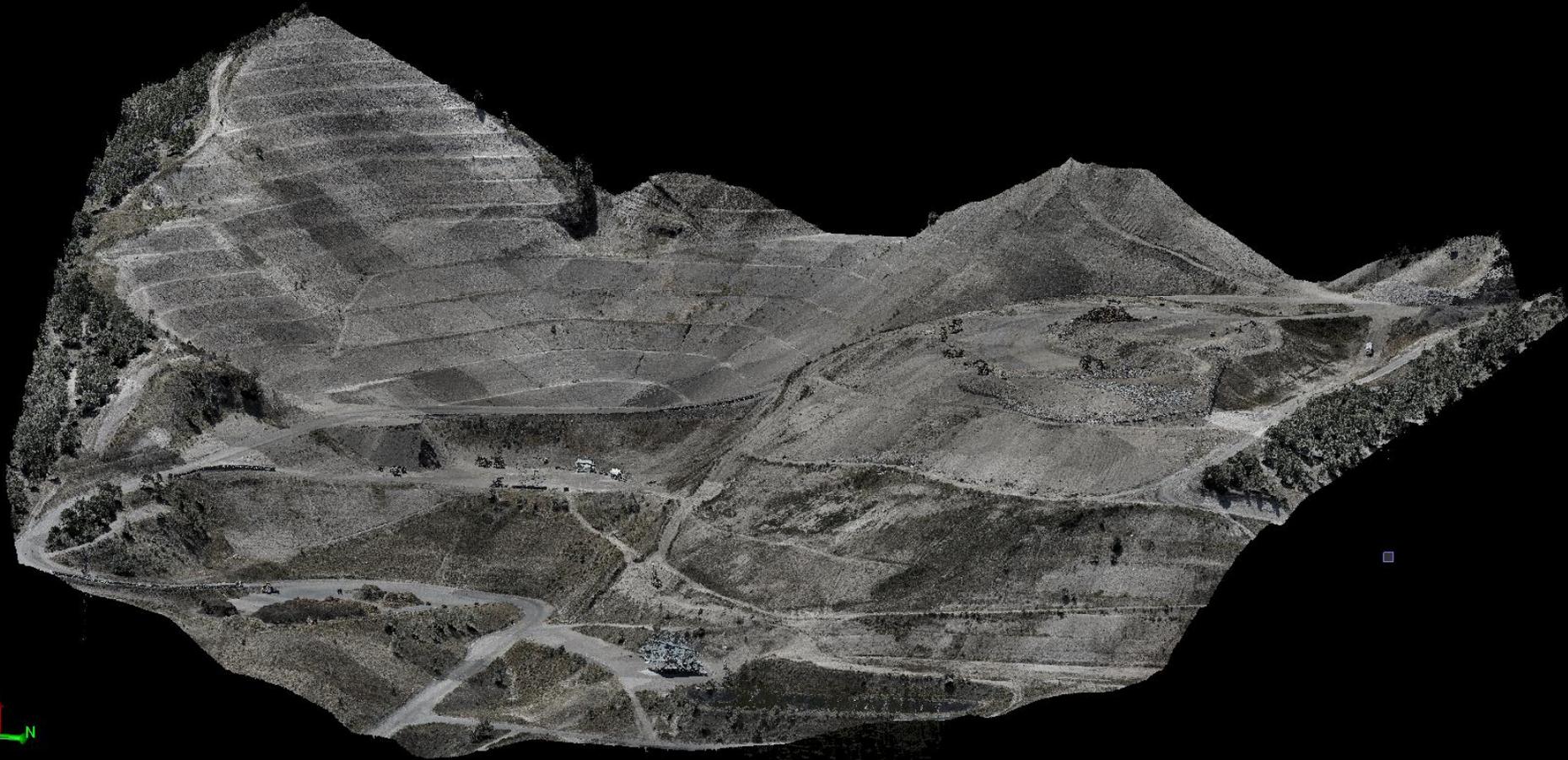
New Vertical Tab Group  
Move to Next Tab Group  
Move to Previous Tab Group  
New Horizontal Tab Group  
Float View

View [My Filter] x



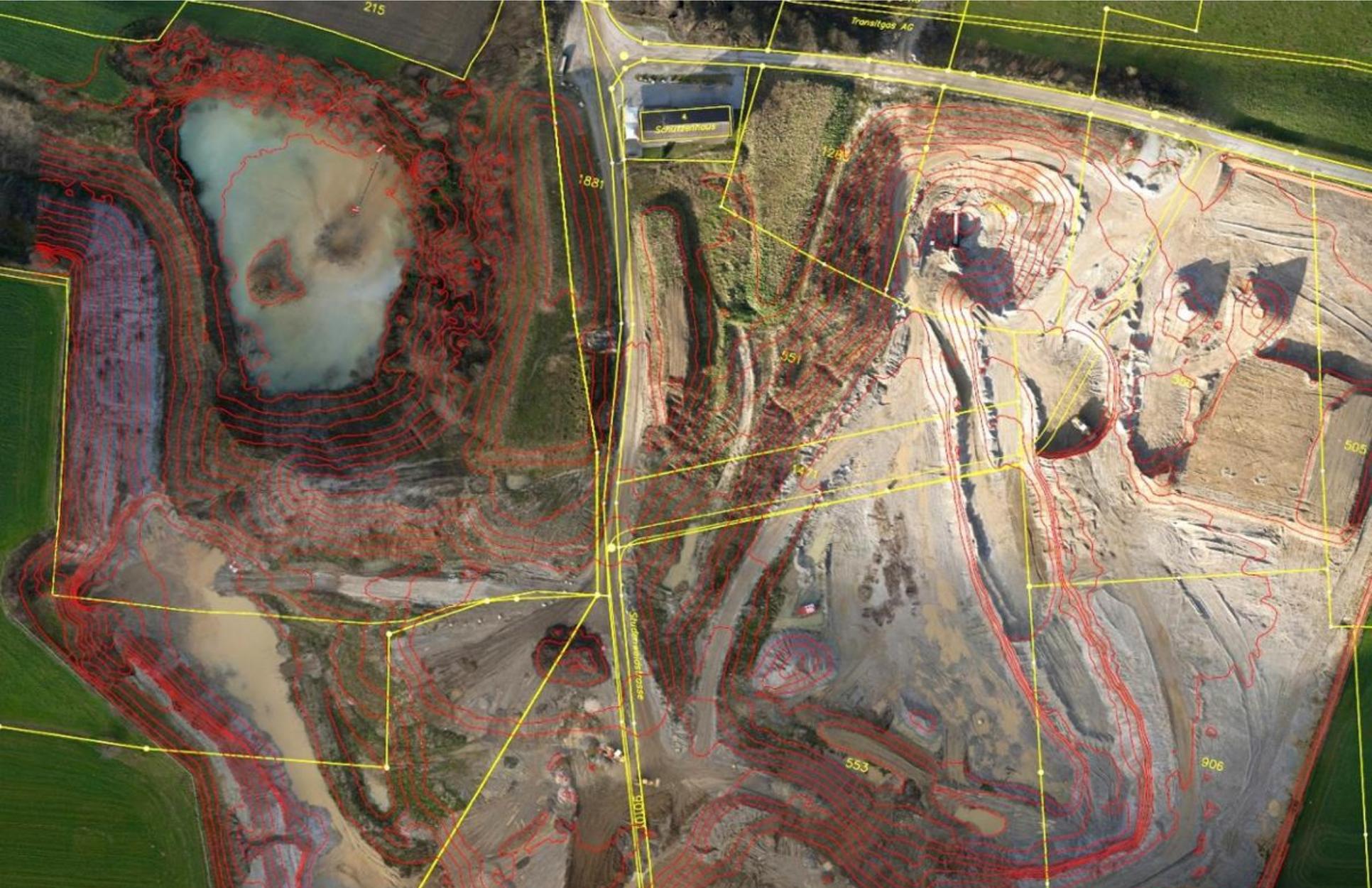
Snap US Survey Foot Grid 0 3243.662 ft. 6494.94

@el... 17 Reminder(s) Free Plans List ... WY\_UAV\_Sympos... Bannock\_Co\_Lan...











# Have Realistic Accuracy Expectations

Don't spec your deliverables off a data sheet



# Landfill

Trimble UX5 and Sony a5100 24 MP

Average 250' AGL

680 acres

6 flights, average 35 minutes each

3 TO/L locations

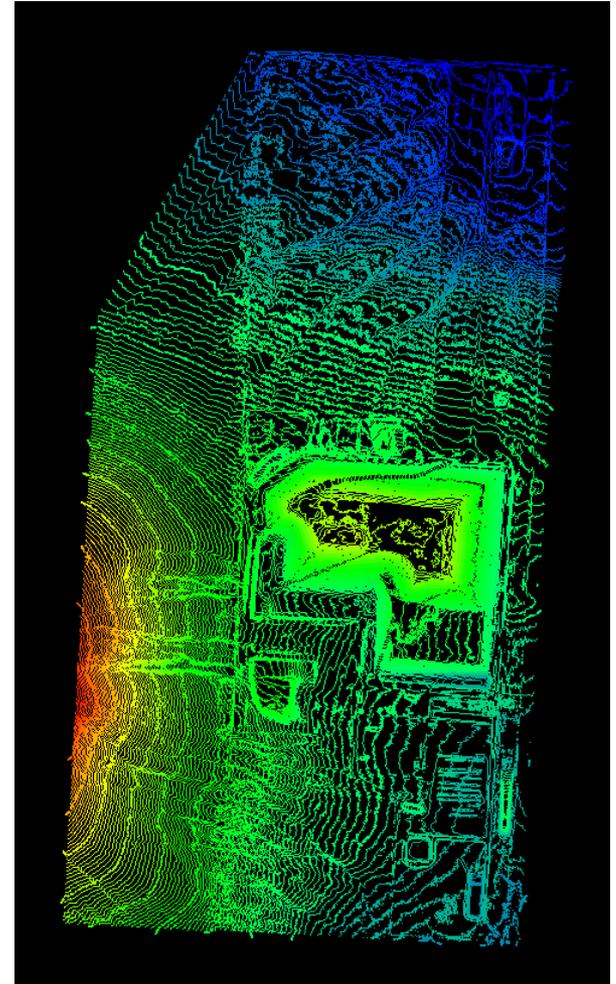
5,700 photos, ~100 discarded

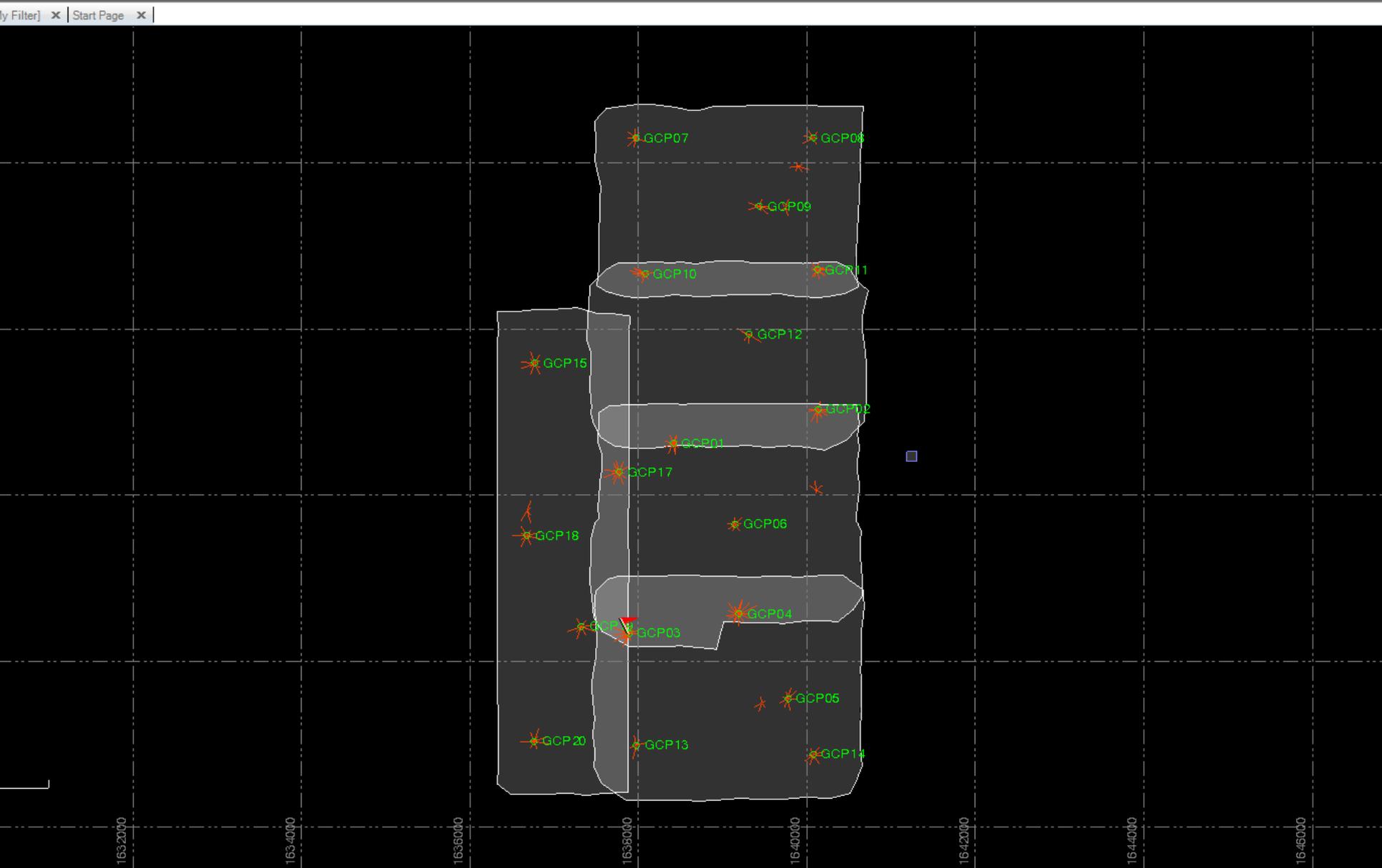
19 GCPs, 7 CPs

2cm GSD

Trimble Business Center Advanced Photogrammetry software

Days of processing time, split into 5 subsets





# Accuracy

Do your GCPs right

Spatial accuracy roughly 4 x GSD

Be conservative

Use check points

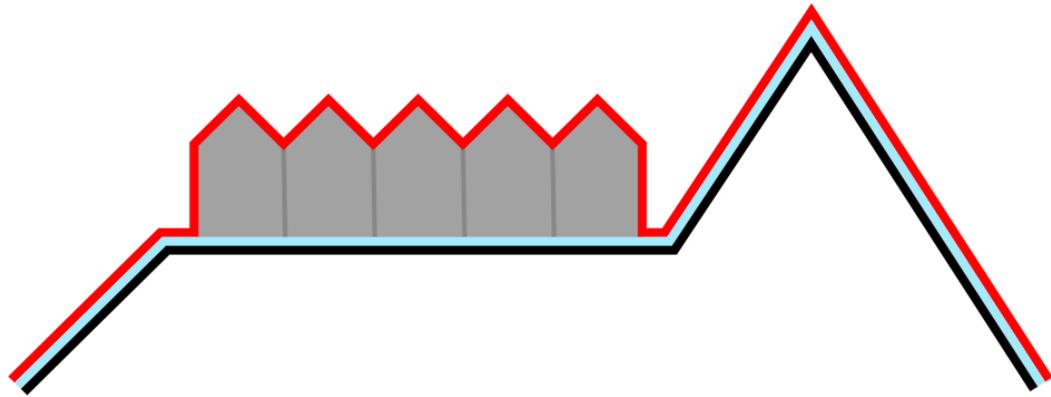
Refer to ASPRS accuracy standards



# Do You Want a Surface Model or a Terrain Model?

They may call it an apple, but they actually want an orange!





|  |                       |
|--|-----------------------|
|   | Digital Surface Model |
|  | Digital Terrain Model |

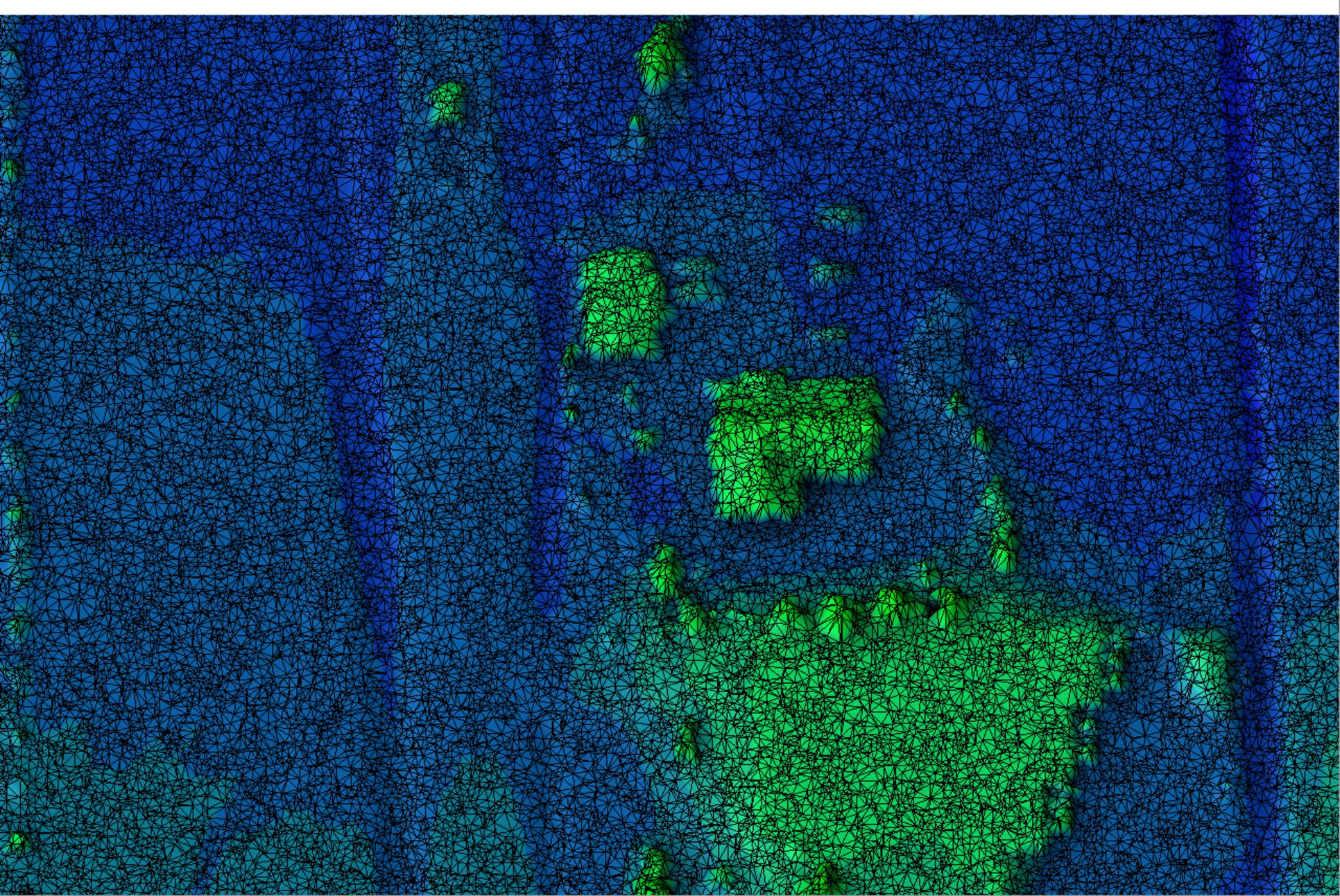
[www.Wikipedia.com](http://www.Wikipedia.com)





Snap International Foot Grid 0 719.080 Speakers / Head

structure from m... WY\_UAV\_Sympos... MilnerButte2 - Tri... Google Earth Pro

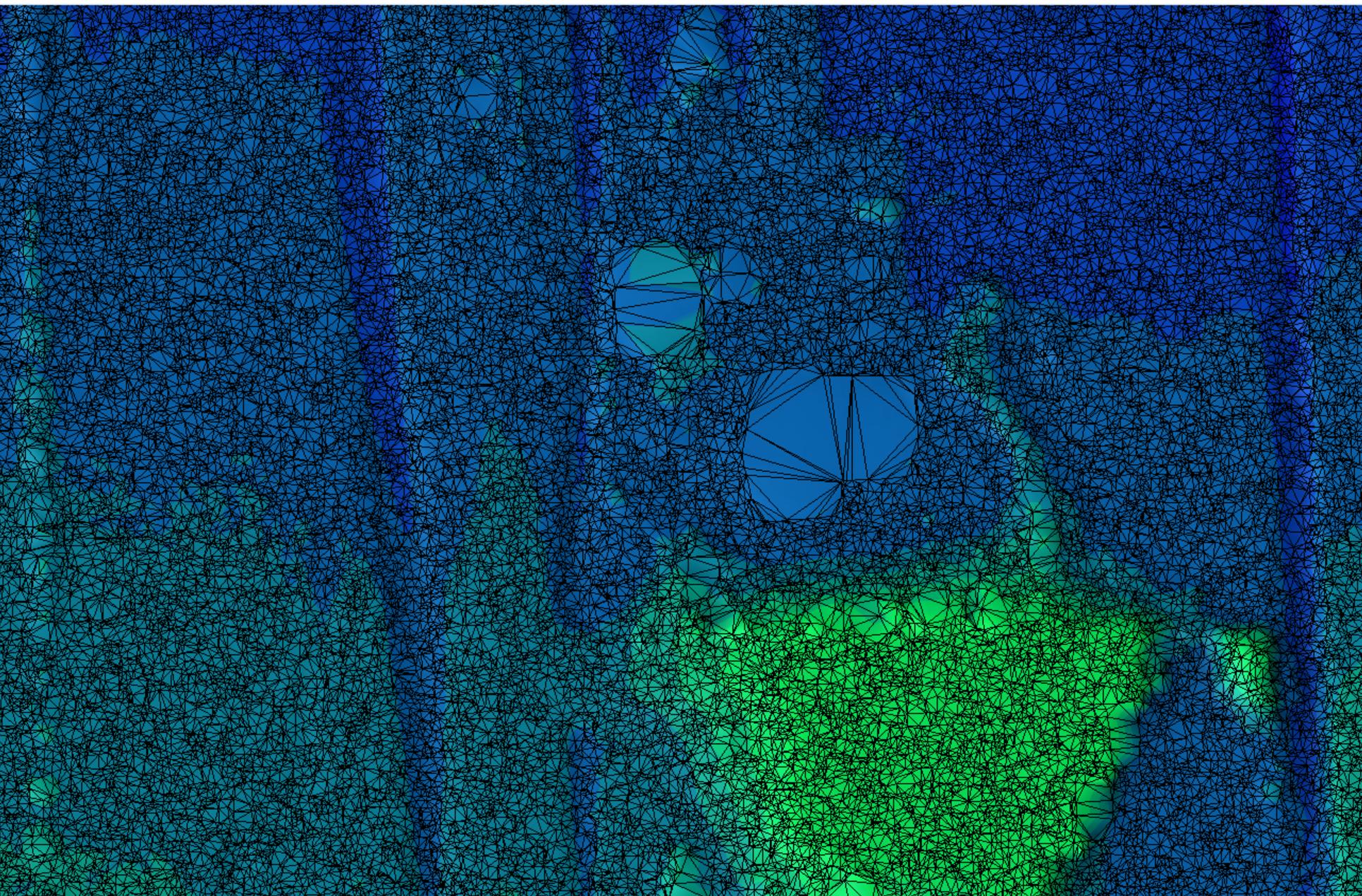


■ Snap International Foot Grid 0

Tuesday, May 17, 2016

structure from m... WY\_UAV\_Sympos... MilnerButte2 - Tri... Google Earth Pro

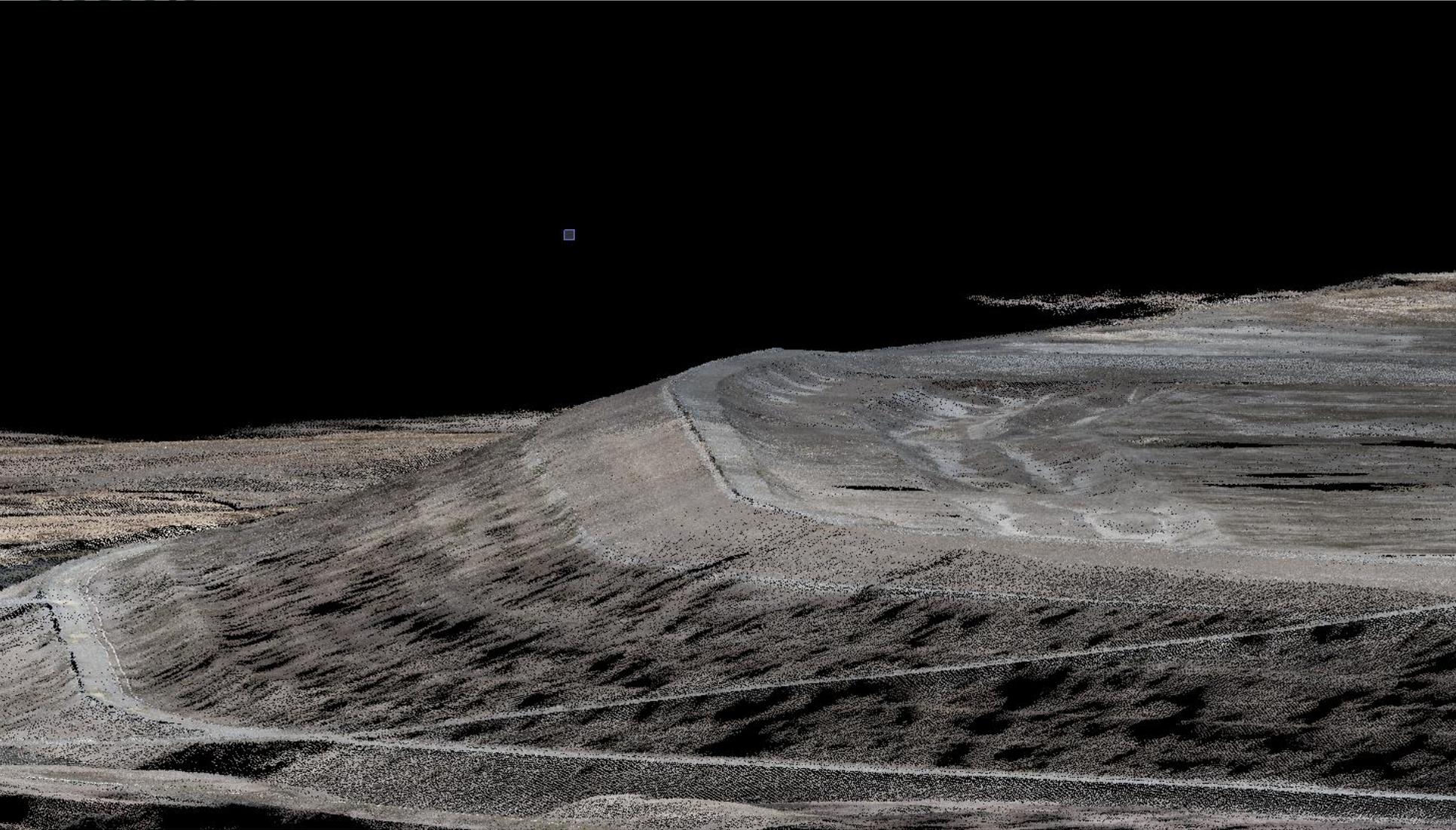
00:36 05/17/2016

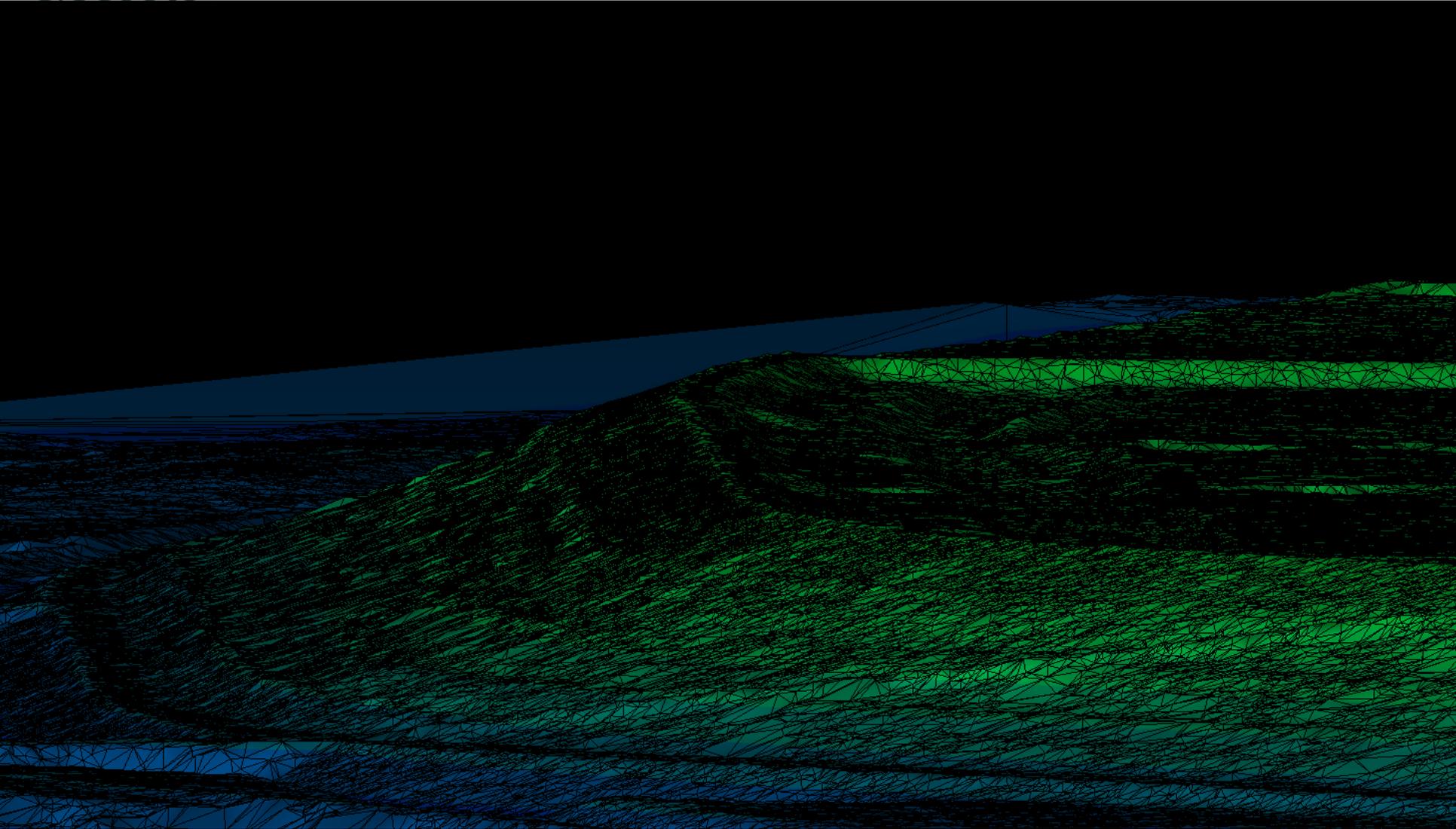


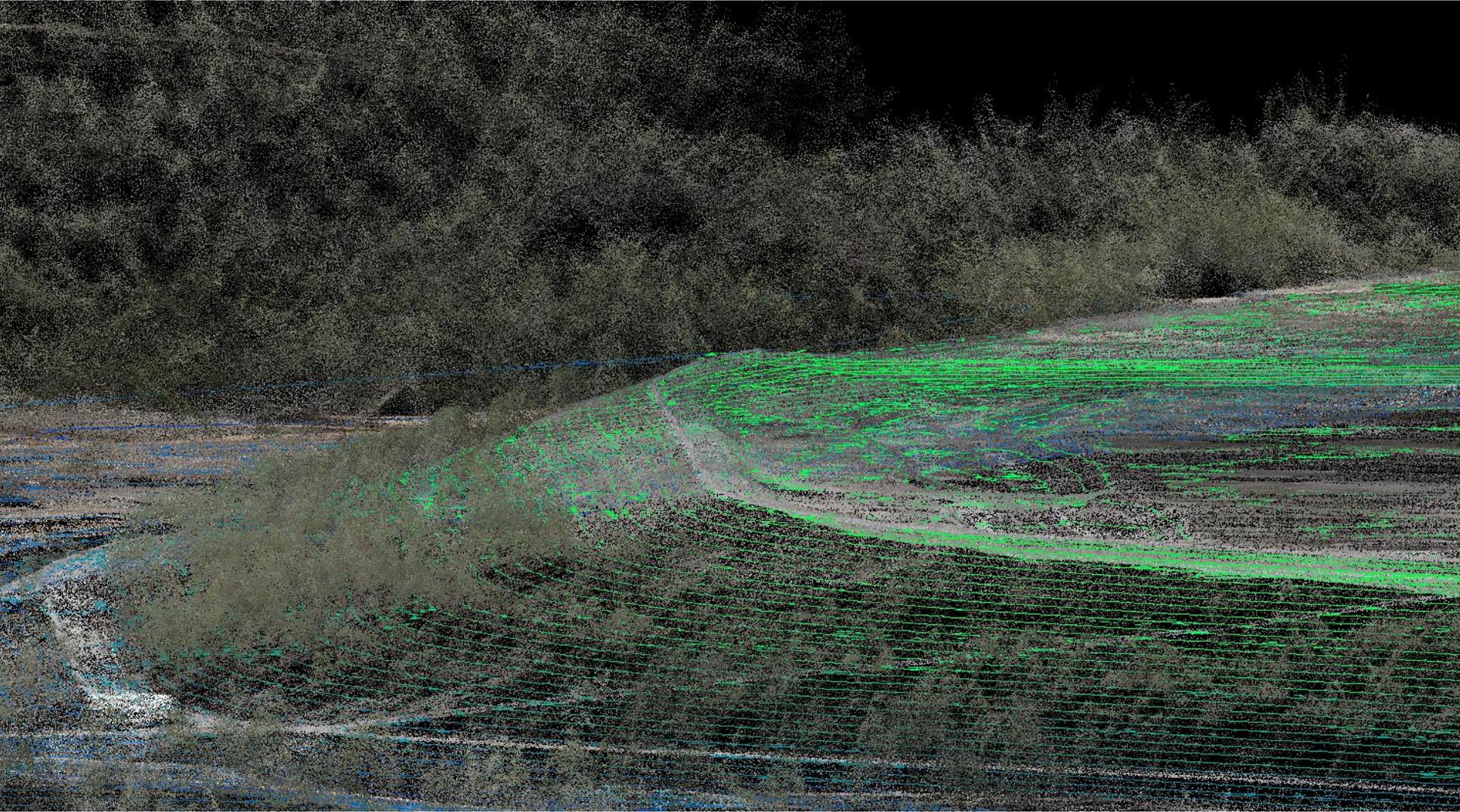
# Vegetation is a Challenge

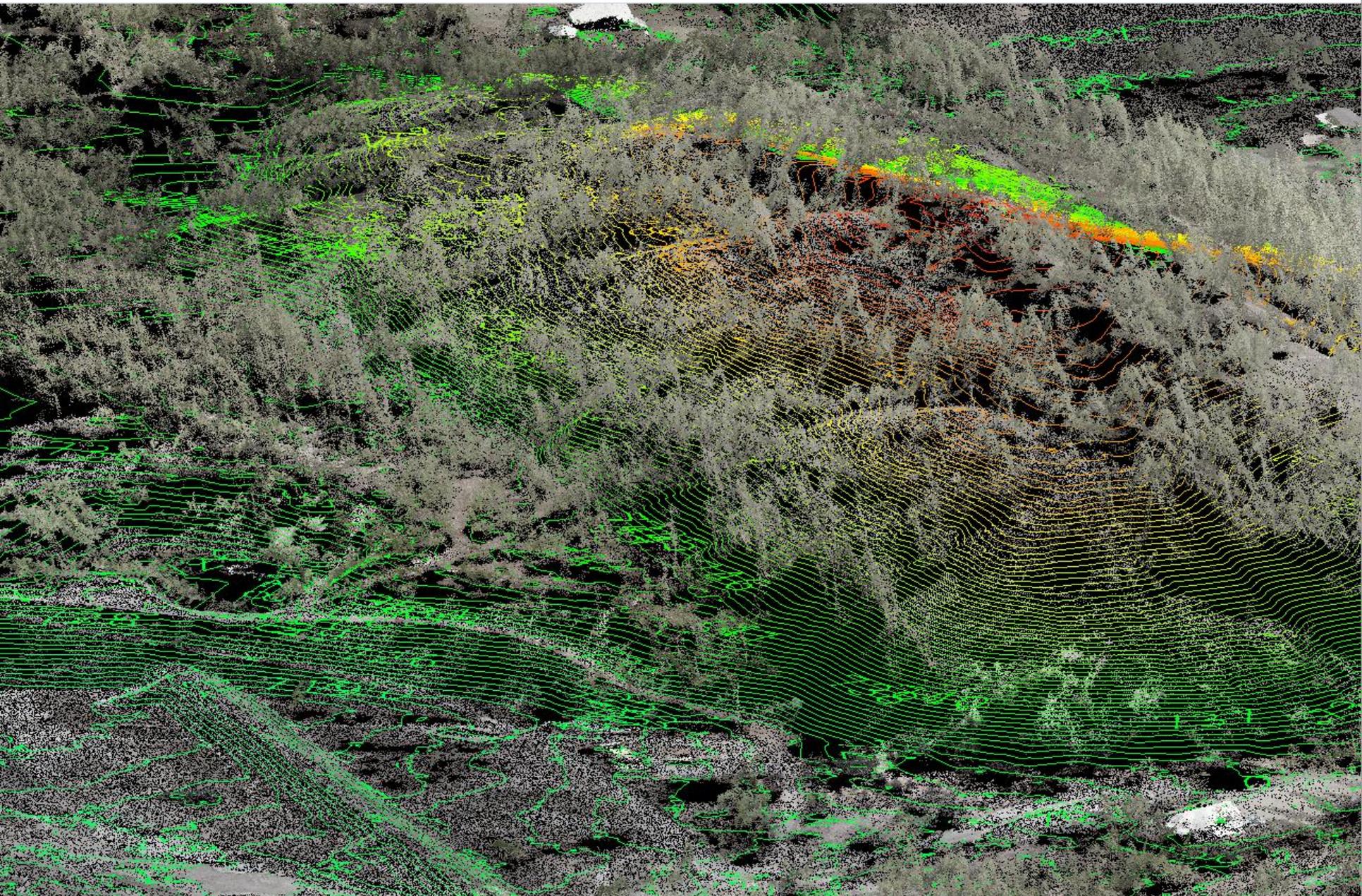












# Data Processing—Man Hours vs. Computer Hours



# Recommended Computer Specs

For non-server, non-supercomputers running UAS photogrammetry programs (e.g. Trimble Business Center, UASMaster, Pix4D, PhotoScan, etc.)

- Solid State Drive
  - 500 GB or bigger
  - 120 GB+ free space for processing
  - ~10 MB/image
- Intel Core i7 or Xeon Processor
  - At least 4 cores, more are better
- 32 GB RAM or more
  - Depends on how many photos
- 4 GB NVIDIA graphics card or better



# Step 1: Relative Adjustment

150 acres, 820 Photos, 24 MP, ~2cm GSD

## **Standard Issue Laptop**

8 GB RAM

500 GB spinning HD

Intel Core i5 processor

Basic graphics card

**6-8 hours**

## **Mobile Workstation**

16 GB RAM

500 GB SSD

Intel Core i7

4GB NVIDIA graphics card

**2 hours**

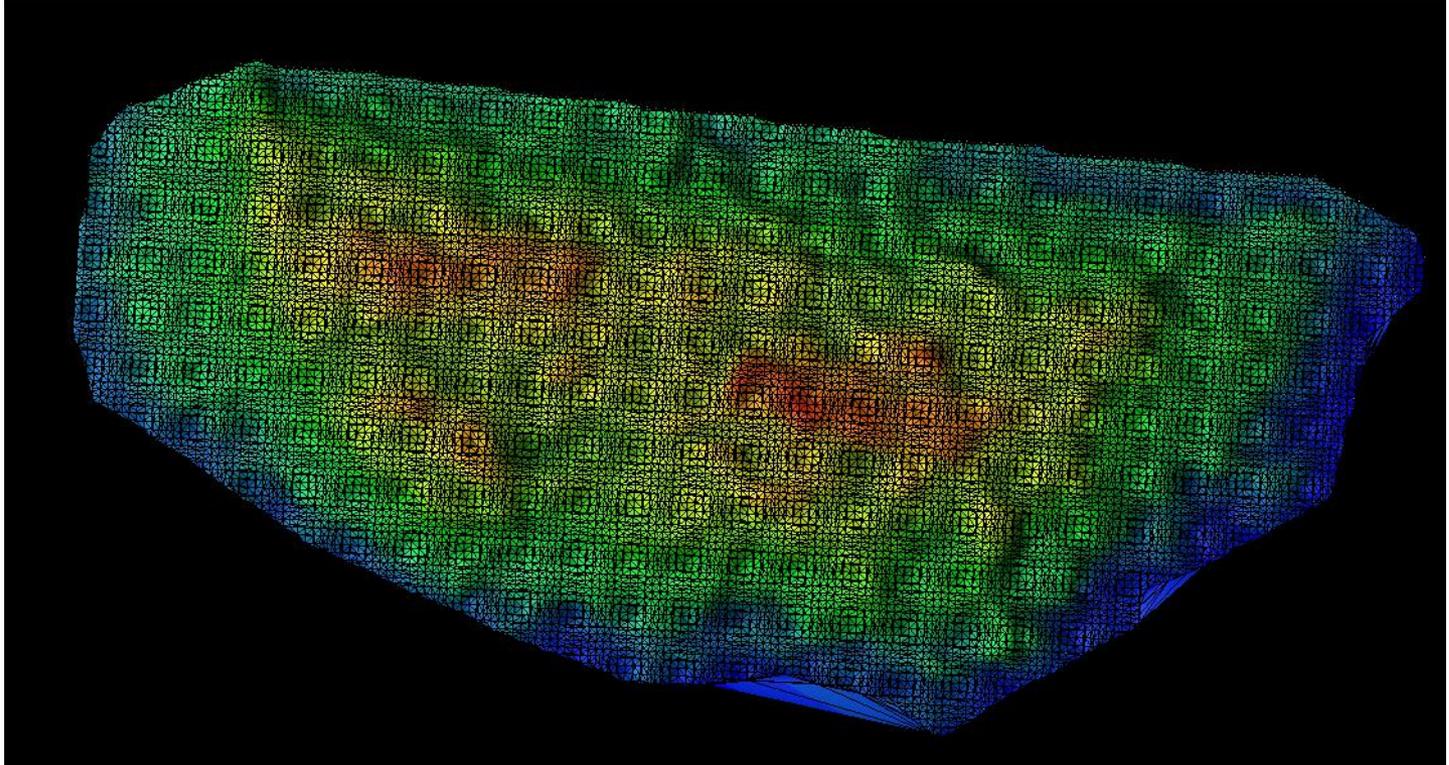


# What kind of data does the end user really want?

And what can they actually work with?

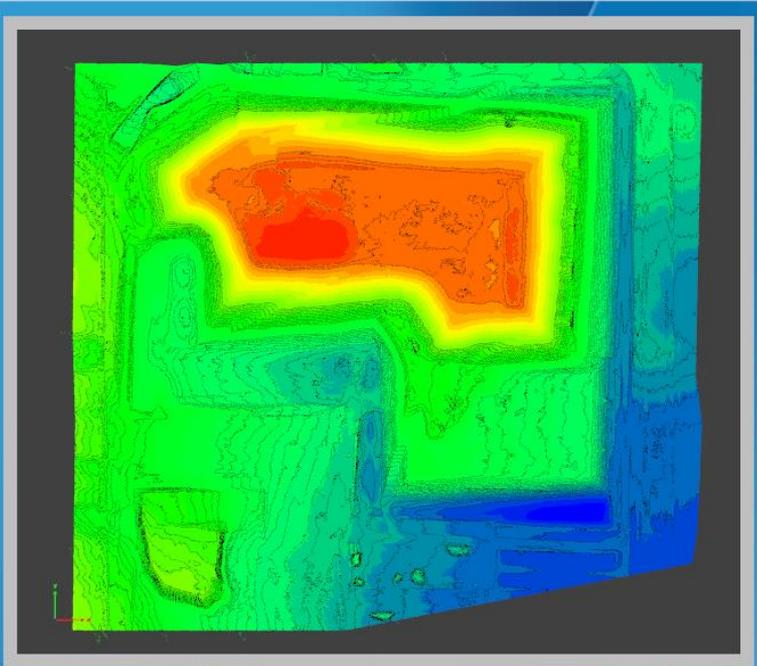






Volume of tire pile = 930  
cu. yds.





Surface model and 2' contours of active portion of Milner Butte Landfill.  
Derived from imagery collected by Electronic Data Solutions via UAS  
(Trimble UX5) in February and March, 2016.



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Trimble Business Center 

Published: 4/26/2016 14:30:28



# The UAV is the Cheap Part

Operations and overhead will get you



# Drones Don't Do Everything!

Know and accept your limitations!



# When to Say NO

If you “think you can”, there’s a good chance you can’t...yet

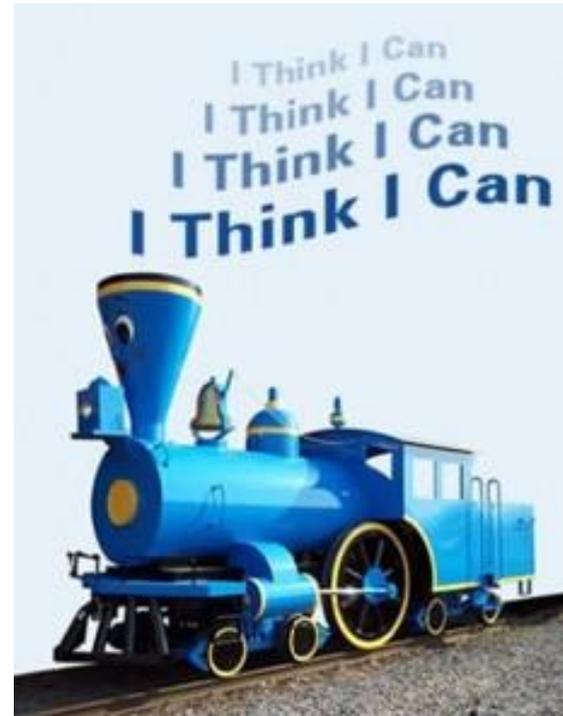
Too big

Too far

Too little money

Wrong equipment

Don’t know how



# Collaborate with Partners





Chase Fly  
UAS Team Coordinator  
Electronic Data Solutions  
(208)324-8006  
chase@elecdata.com



# OPEN SOURCE GIS

Kevin Jones

Idaho State Tax Commission

[Kevin.Jones@tax.Idaho.gov](mailto:Kevin.Jones@tax.Idaho.gov)

# QGIS DESKTOP MAPPING SUITE

- 100% open source.
- Licensed under GNU General Public License.
- Thousands of developers constantly working on it.
- Current release 2.14 Essen released 5/20/2016
- QGIS offers many common GIS functionalities provided by core features and plugins. A short summary of six general categories of features and plugins is presented below, followed by first insights into the integrated Python console.
- **View data**
- You can view and overlay vector and raster data in different formats and projections without conversion to an internal or common format. Supported formats include:
- Spatially-enabled tables and views using PostGIS, Spatialite and MS SQL Spatial, Oracle Spatial, vector formats supported by the installed OGR library, including ESRI shapefiles, MapInfo, SDTS, GML , File and Personal Geodatabases and many more.
- Raster and imagery formats supported by the installed GDAL (Geospatial Data Abstraction Library) library, such as GeoTIFF, ERDAS IMG, ArcInfo ASCII GRID, JPEG, PNG, and many more. Online spatial data served as OGC Web Services, including WMS, WMTS, WCS, WFS, and WFS-T.

# QGIS MAPPING SUITE

- **Explore data and compose maps**

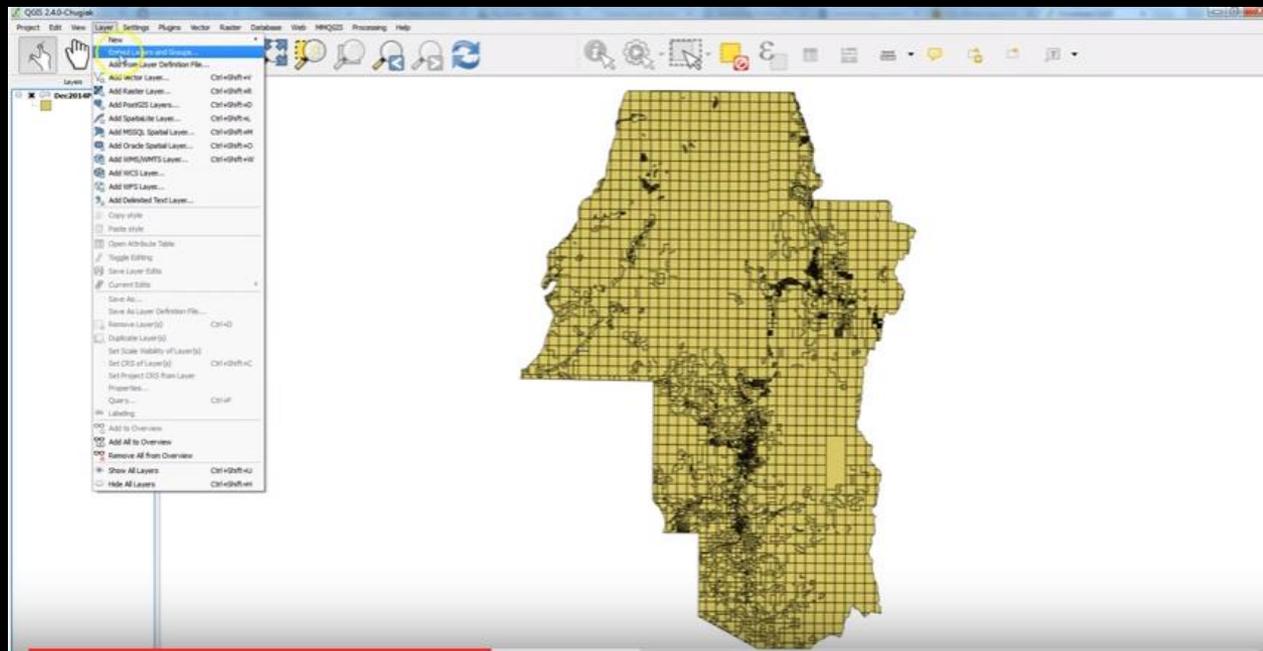
- You can compose maps and interactively explore spatial data with a friendly GUI. The many helpful tools available in the GUI include:
  - QGIS browser
  - On-the-fly reprojection
  - DB Manager
  - Map composer
  - Overview panel
  - Spatial bookmarks
  - Annotation tools
  - Identify/select features
  - Edit/view/search attributes
  - Data-defined feature labeling
  - Data-defined vector and raster symbology tools
  - Atlas map composition with graticule layers
  - North arrow scale bar and copyright label for maps
  - Support for saving and restoring projects

# QGIS MAPPING SUITE

- **Publish maps on the Internet**
- QGIS can be used as a WMS, WMTS, WMS-C or WFS and WFS-T client, and as a WMS, WCS or WFS server. Additionally, you can publish your data on the Internet using a webserver with UMN MapServer or GeoServer installed.
- **Extend QGIS functionality through plugins**
- QGIS can be adapted to your special needs with the extensible plugin architecture and libraries that can be used to create plugins. You can even create new applications with C++ or Python!

# QGIS INTRO DEMO

Demo



# HOW TO MAKE A WEBMAP IN LESS THEN 5 MINUTES WITH QGIS

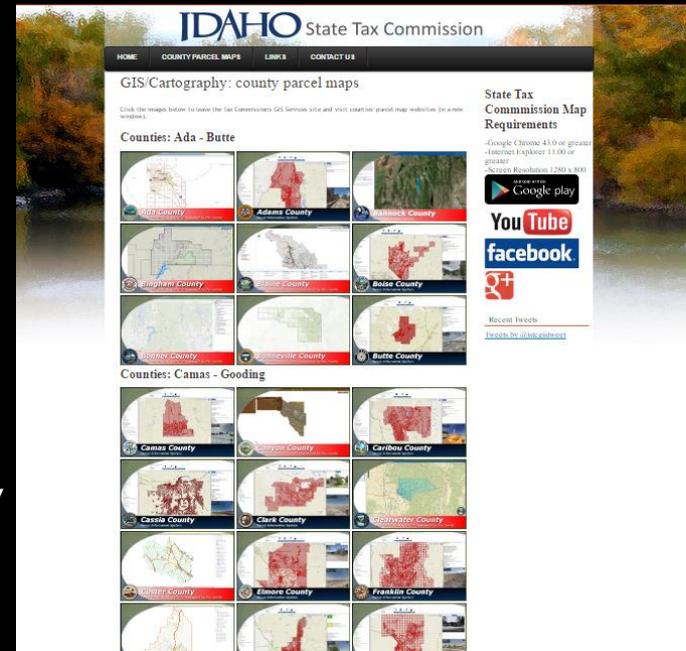
- Using openlayers or leaflet API

[Demo](#)

# IDAHO STATE TAX COMMISSION GOOGLE JAVASCRIPT API MAP SUITE

- Built using Google's JavaScript API.
- Can handle up to 100,000 points.
- Icons with blue labels are the Google Maps that the counties maintain.
- Measure/Print/Query tools
- Includes Google's popular streetview
- Unlike a lot of GIS applications allows for Many to many or one to many relationships
- Data on maps depends on what the county Assessor wants.

[Valley County DEMO](#) [Parcel Gallery DEMO](#)

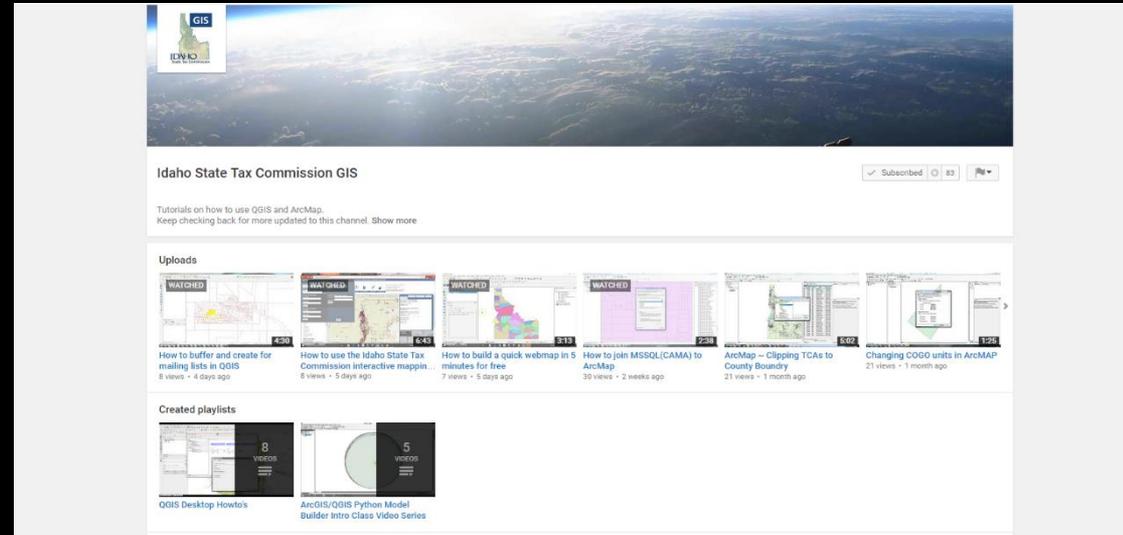


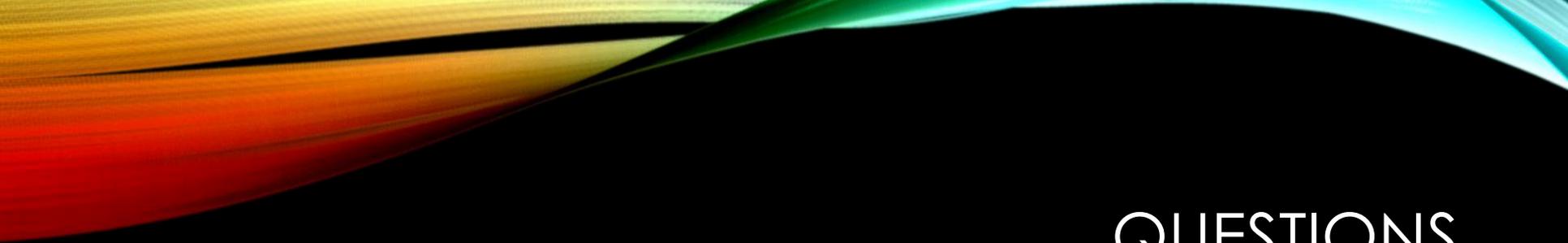
# GOOGLE WEBMAP DEMO

- [Demo](#)

# YOUTUBE CHANNEL AND TWITTER

- All map updates are posted via twitter @ISTCGISTWEET
- Our YouTube channel can be found by search for Idaho State Tax Commission GIS on the YouTube search bar.





# QUESTIONS

- Thanks



# Elevation Technical Working Group

Nancy Glenn  
June 2016 update

# Activities

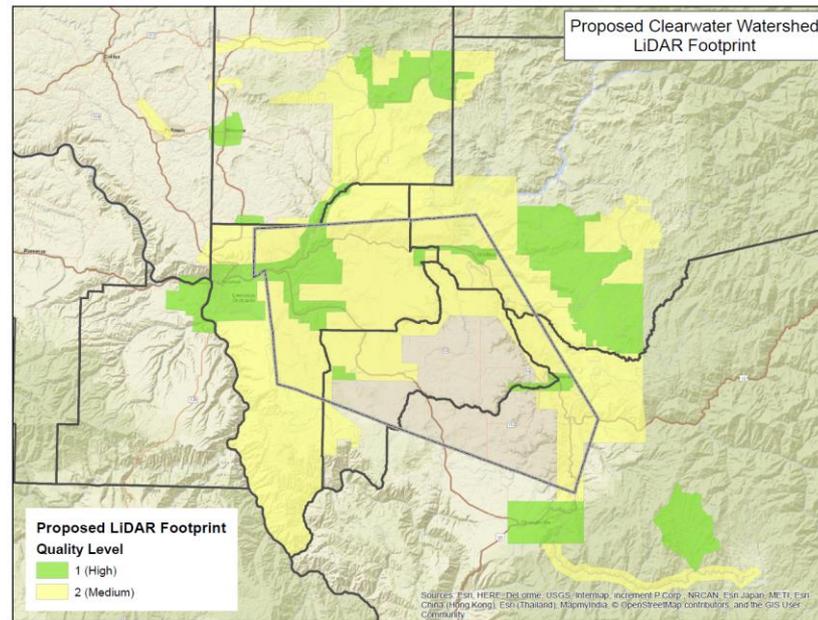
- Idaho Lidar Consortium: <https://www.idaholidar.org/>
- Statewide lidar acquisition plan
- USGS 3DEP lidar acquisition: Clearwater
- FEMA lidar acquisition: SE Idaho





# USGS 3DEP lidar acquisition: Clearwater

## *Acquisition Fall 2016*





## Clearwater Partners

- Nez Perce Tribe: Land Services
  - Nez Perce Tribe: Forestry
  - Nez Perce County
  - City of Lewiston
  - Lewiston MPO
  - Port of Lewiston
  - Idaho Dept of Lands
  - Idaho Transportation Dept.
  - Asotin County
  - Asotin PUD
  - Asotin MPO
- USGS
  - USFS
  - FEMA
- Alison Tompkins  
Bill Reynolds  
Laurie Ames  
Ryan McDaniel  
Kelly Stone  
Tom Carlson
- \*Idaho County



*Lunchtime!*



# GIS Accomplishments

*What's going on in Idaho?....*

# ITD IPLAN – IDFG Data Sharing



LEAVE THIS GROUP SHARE

Services published by Idaho Fish and Game for use by Environmental staff in iPlan ▾

Facebook Twitter

## Group Content

[Title](#) ▲ [Owner](#) [Rating](#) [Views](#) [Date](#)

### All Results

- Maps
- Layers
- Scenes
- Apps
- Tools
- Files

Show ArcGIS Desktop Content



[Open](#) ▾ [Details](#)

**Elk Seasonal Ranges**  
Elk Seasonal Range Habitat Suitability  
Seasonal range habitat suitability of Elk in Idaho.  
 Map Image Layer by idahofishandgame  
Last Modified: May 19, 2016  
★★★★★ (0 ratings, 0 comments, 98 views)



[Open](#) ▾ [Details](#)

**Federally Protected Species - Proposed and Designated Critical Habitat**  
Idaho's Final and Proposed Federally Designated Critical Habitat and Essential Fish Habitat.  
 Feature Layer by idahofishandgame  
Last Modified: March 16, 2016  
★★★★★ (0 ratings, 0 comments, 2 views)



[Open](#) ▾ [Details](#)

**Federally Protected Species - Threatened, Endangered, Candidate, and Proposed Species**  
This dataset contains a SUBSET of the IFWIS Species Diversity Database which are recorded wildlife observations of species in Idaho.  
 Feature Layer by idahofishandgame  
Last Modified: March 30, 2016  
★★★★★ (0 ratings, 0 comments, 1 view)

## Group Details

Owner: IdahoFishGame  
Status: Organization  
Contributors: Members  
Tags: Idaho, idfg, fish, game, fish and game, wildlife

### 35 Members

- IdahoFishGame
- AngieSchmidt
- asalmore
- bbutterfield9
- blacabanne
- chris.branstetter
- COMPASS\_GIS
- connie.jones
- D4\_GISData
- D6\_GISData
- dan.armstrong



# Leveraging GIS for Wildfire Decision Support

Keith T. Weber<sup>1</sup>, GISP

John Schnase<sup>2</sup>, Mark Carroll<sup>2</sup>, Jeff May<sup>1</sup>, Cody Feldman<sup>1</sup>, Bryan Nicholson<sup>1</sup>, Kindra Serr<sup>1</sup>, Roger Gill<sup>2</sup>, and Maggie Wooten<sup>2</sup>



- 1- ISU GIS TReC
- 2- NASA Goddard Space Flight Center



# What is RECOVER?

- RECOVER: Rehabilitation Capability Convergence for Ecosystem Recovery
- NASA Applied Sciences Program sponsored project



RECOVER is a NASA Applied Sciences sponsored project. K. T. Weber (PI), J. Schnase (Co-PI) and M. Carroll (Co-PI), Goddard Space Flight Center

# What is RECOVER?

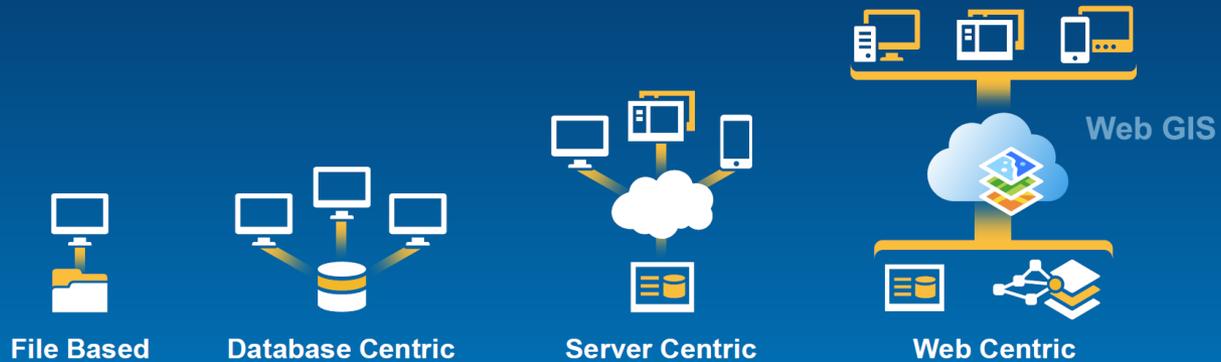
- Customer-driven, Customer-centric\*
- Decision Support System (DSS)
  - Rapid assembly of site-specific data
  - Delivered in customized GIS analysis environment
  - Wildfire focus



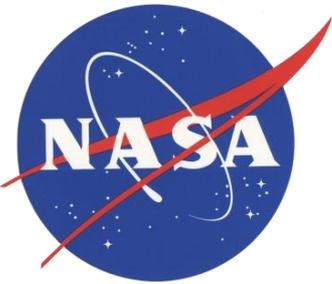
\* Our “customer” is any wildfire management agency (BLM, NPS, USFS, etc.)

# Benefits of RECOVER

## Leveraging Common Computing Architecture



- Works seamlessly across all devices
- Reduces need for custom applications
- Platform for integration with other business systems
- Cross organizational collaboration
- Ready to use content and services
- Content management system



# How Does it Work?

- Step 1: Ignition



# How Does it Work?

- Step 2: Generate the RECOVER Web Map



**Step 1: Import Fire Boundary Shapefile (optional)**

Added Shapefiles: 1

[Clear](#)

**Step 2: Create RECOVER Web Application**

State: **ID**

Upload fire boundary: **CharlotteFire.zip** [Go back](#)

Area of Interest:

[Clear](#)

Layers to Clip:

- NHD
- Roads
- Habitat
- LandslidePotential
- PLSS
- Wetlands
- Geology
- WBD
- Fires1950\_Present
- Soils\_STATSGO
- Soils\_SSURGO
- SMA
- Slope\_Resample.tif
- Elevation\_Resample.tif
- Aspect\_Resample.tif
- FRG.tif
- EVT.tif
- EVC.tif
- ESP.tif
- BPS.tif

Email address: **webekeit@isu.edu**

[Help](#) [Submit](#)



2 km  
1 km  
lat: 43.9277862 - long: -112.869491

# What's Happening

- Our RECOVER server is...
  - Clipping 25 base layers (raster and vector) to the AOI polygon
  - Assembling these layers into a Map Service with uniform symbology/colormaps and naming
  - Creating fire-specific reports

**Naming convention of RECOVER Base Layer data**

The following list describes the RECOVER base layers available to our partners along with the standard naming convention applied to the web services hosted at ISU's GIS TRoC (please note the exact name including capitalization and the use of underscores).

Geology  
Habitat  
LandslidePotential  
NHD  
PLSS  
Roads  
SMA  
Soils\_SSURGO  
Soils\_STATSGO  
Soils\_STATSGO\_KFactor  
WatershedsWBD  
Wetlands

Past fire datasets

HistoricFires  
HistoricFires\_PastDecade  
FRG\_FireRegimeGroup

Vegetation datasets

BPS\_BioPhysicalSetting  
ESP\_EnvironmentalSitePotential  
EVC\_ExistingVegetationCover  
EVT\_ExistingVegetationType

Topography datasets

Elevation  
Aspect  
Hillshade  
Slope\_degree  
Slope\_percent  
SlopesGTE30deg

\* The spatial reference system for these data is USA Contiguous Albers Equal Area Conic USGS version, NAD83, WKID: 102039

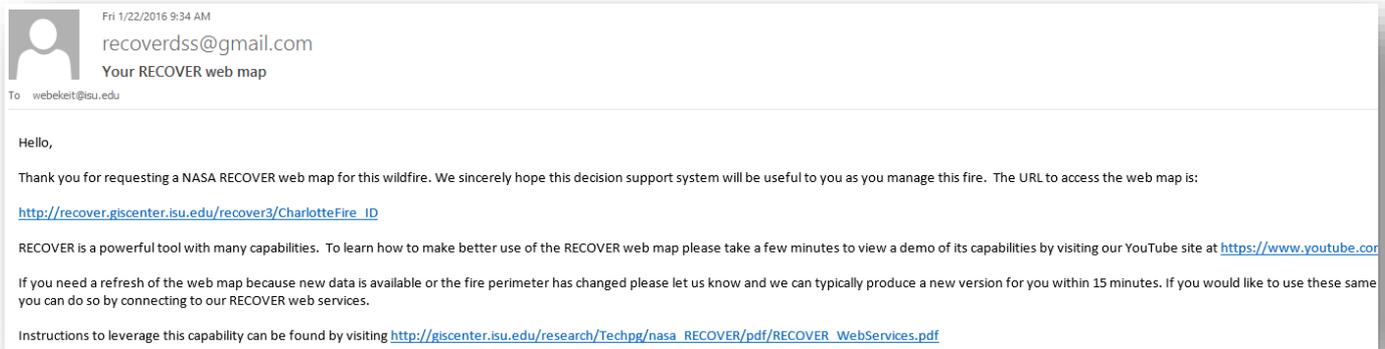
# Data Architecture

- RECOVER covers the Western US
- Esri ArcGIS 10.3.1
  - File Geodatabase
  - Vector and raster data
  - Automated Map Services
- Transitioning to 10.4.1



# How Does it Work?

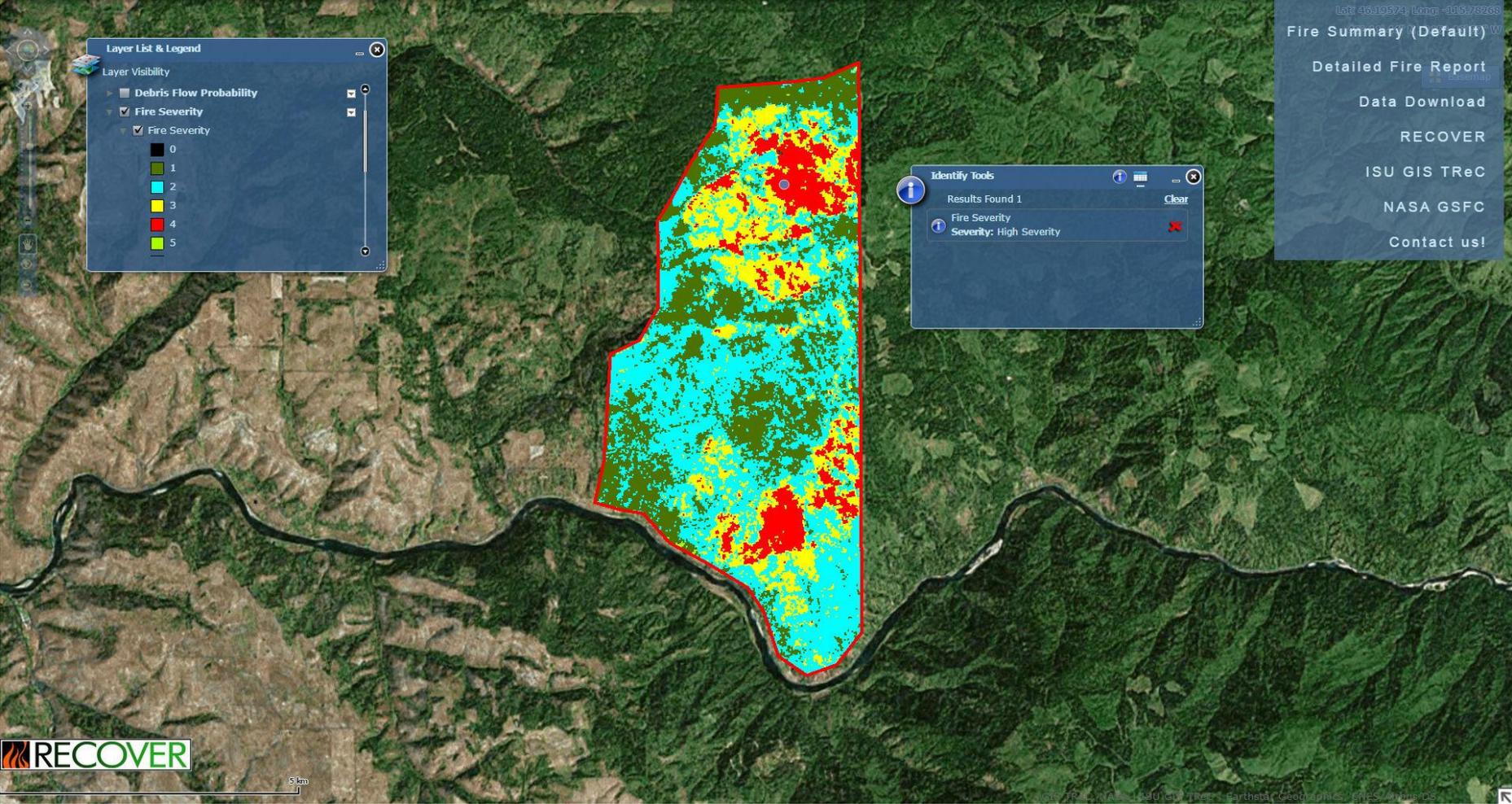
- Step 3: Check your E-mail



# How Does it Work?

- Step 4: Visit and use your Web Map
  - Visit YouTube for a full tour 
  - <http://bit.ly/recoverdemo>





5km

# GIS Layers

- Each RECOVER web map contains 25 base layers
- One real-time data feed (Collector)
- Fire-specific reports

# Fire-specific Reports

**Soda Fire - Summary Report**

| Administration Agency | Acres          |
|-----------------------|----------------|
| <b>BLM</b>            | 227,635        |
| BOR                   | 196            |
| PVT                   | 42,824         |
| ST                    | 12,741         |
| <i>Total Acres</i>    | <i>283,396</i> |

**Soda Fire - Detailed Report**

| Admin. Unit Name          | Area Symbol  | Map Unit Symbol | Acres |
|---------------------------|--------------|-----------------|-------|
| Bureau of Land Management | ID665        |                 |       |
|                           |              | BrB             |       |
|                           |              | GaB             |       |
|                           |              | NaB             |       |
|                           |              | NaC             |       |
|                           |              | QcB             |       |
|                           |              | QcD             |       |
|                           |              | QcE             |       |
|                           |              | VaD             |       |
|                           |              | VaE             |       |
|                           |              | Ar              |       |
|                           | <b>ID675</b> | 1               |       |
|                           |              | 100             |       |
|                           |              | 11              |       |
|                           |              | 112             |       |
|                           |              | 121             |       |

**Ecological Site/Plant Association and Vegetation (ID)**

Owyhee County Area, Idaho

[Composition of forest understorey vegetation is based on canopy cover. Composition of rangeland vegetation is based on dry weight]

| Map symbol and soil name | Ecological site or plant association | Common trees | Forest understorey or rangeland characteristic vegetation   | Composition |                              |
|--------------------------|--------------------------------------|--------------|---|-------------|------------------------------|
|                          |                                      |              |   | Forest      | Range                        |
|                          |                                      |              |   | Pct         |                              |
| 1:                       |                                      |              |   |             |                              |
| Acretane                 | LOAMY 11-13 ARTRT/PSSPS (R025X043ID) | ---          | bluebunch wheatgrass<br>basin big sagebrush<br>antelope bitterbrush<br>other shrubs<br>other perennial forbs<br>other perennial grasses | ---         | 50<br>20<br>5<br>5<br>5<br>5 |
| Rock outcrop             | ---                                  | ---          | ---   | ---         | ---                          |

Survey Area Version: 11  
 Survey Area Version Date: 08/13/2012

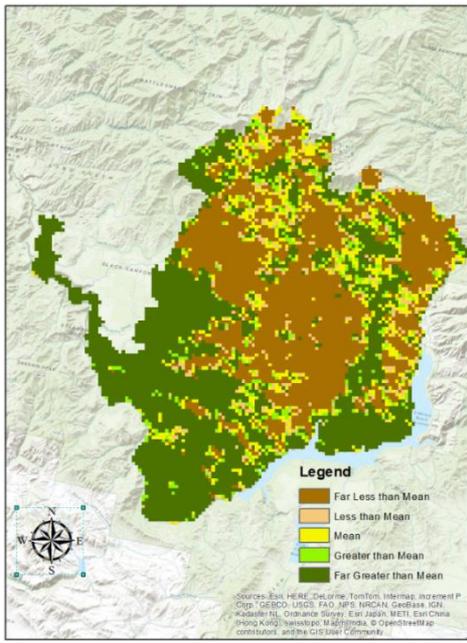
Page 1

# Additional data requests

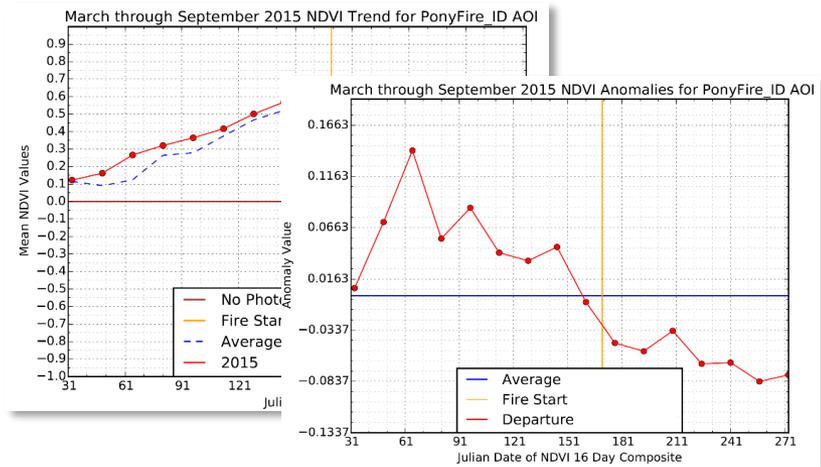
- Fire-affected Vegetation
- Debris-flow probability (AKA mudslide or landslide)
- NDVI vegetation anomaly
  - 16-day MODIS NDVI-composite imagery
  - Long-term average NDVI (2001-present)
  - Current fire season compared against long-term trend

# NDVI Anomaly Data

## Map layer

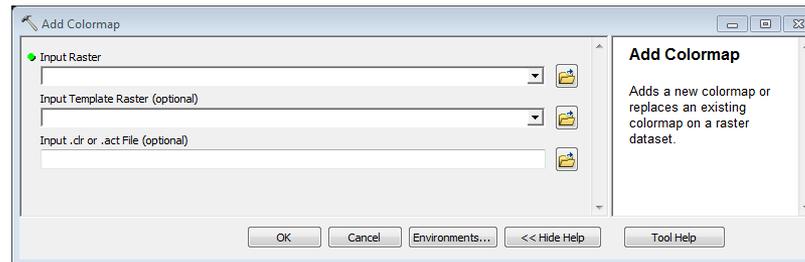


## Charts



# Transform Data into Information

- Help your data speak to the user
  - Authoritative source data
  - Common sense Colormaps (raster)



- Accepted symbology (Map service and Layer files)

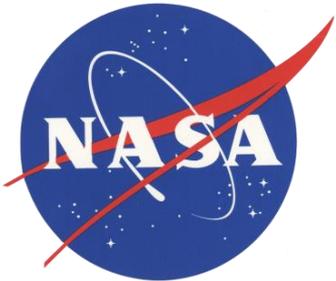
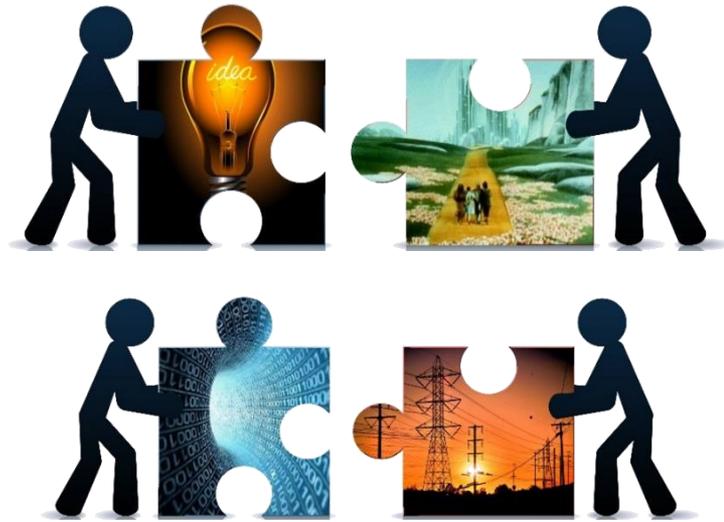
# Listen to the Customer



- “Make it mobile”
- “High-resolution is nice, but fast is critical”
  - NIFC
- “Drowning in Data, but still thirsting for Information”
  - USFS RSAC

# Assemble a Great Team

- Idea
- Plan
- Infrastructure
- Data
- **People**



# Questions?



RECOVER is a NASA Applied Sciences sponsored project. K. T. Weber (PI), J. Schnase (Co-PI) and M. Carroll (Co-PI), Goddard Space Flight Center

# Under the Hood

- Dell PowerEdge R720 server
  - Windows Server 2012 R2
  - Two (2) 8-core Xeon E5 Processors (16 cores total)
  - 112 GB RAM
  - 3.5 TB Hard drive space
  - Dual redundant, hot swappable power supplies
  - Hardware RAID 5 fault tolerance
- Gigabit Ethernet (soon 10 Gbps)

# Geodetic Control Technical Working Group

GC-TWG

Chair: Keith T Weber, GISP

ISU GIS TReC



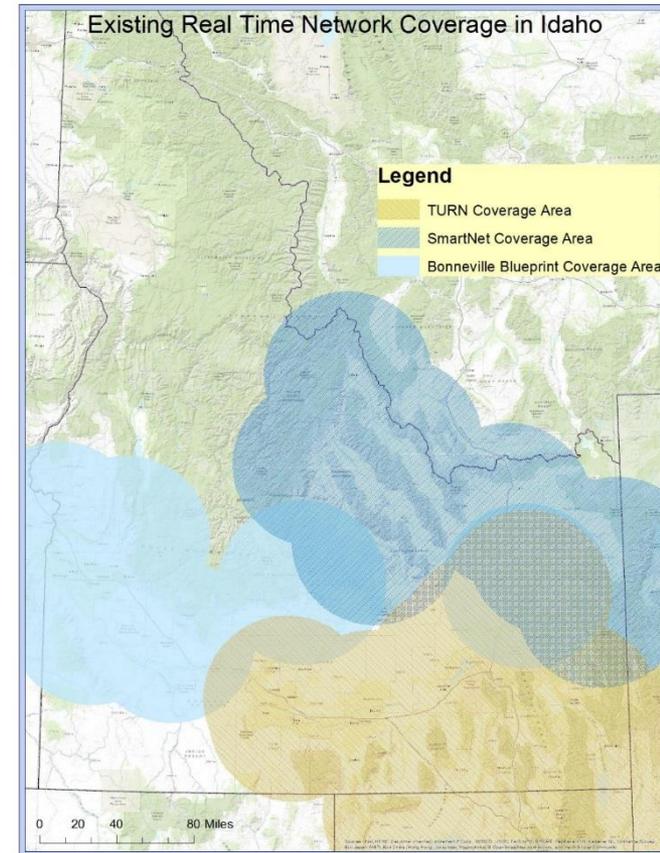
# Schedule



- Meets bi-monthly
- Fourth Thursday, 3-4pm MT
- Next meeting is July 28th

# Topics/Focus

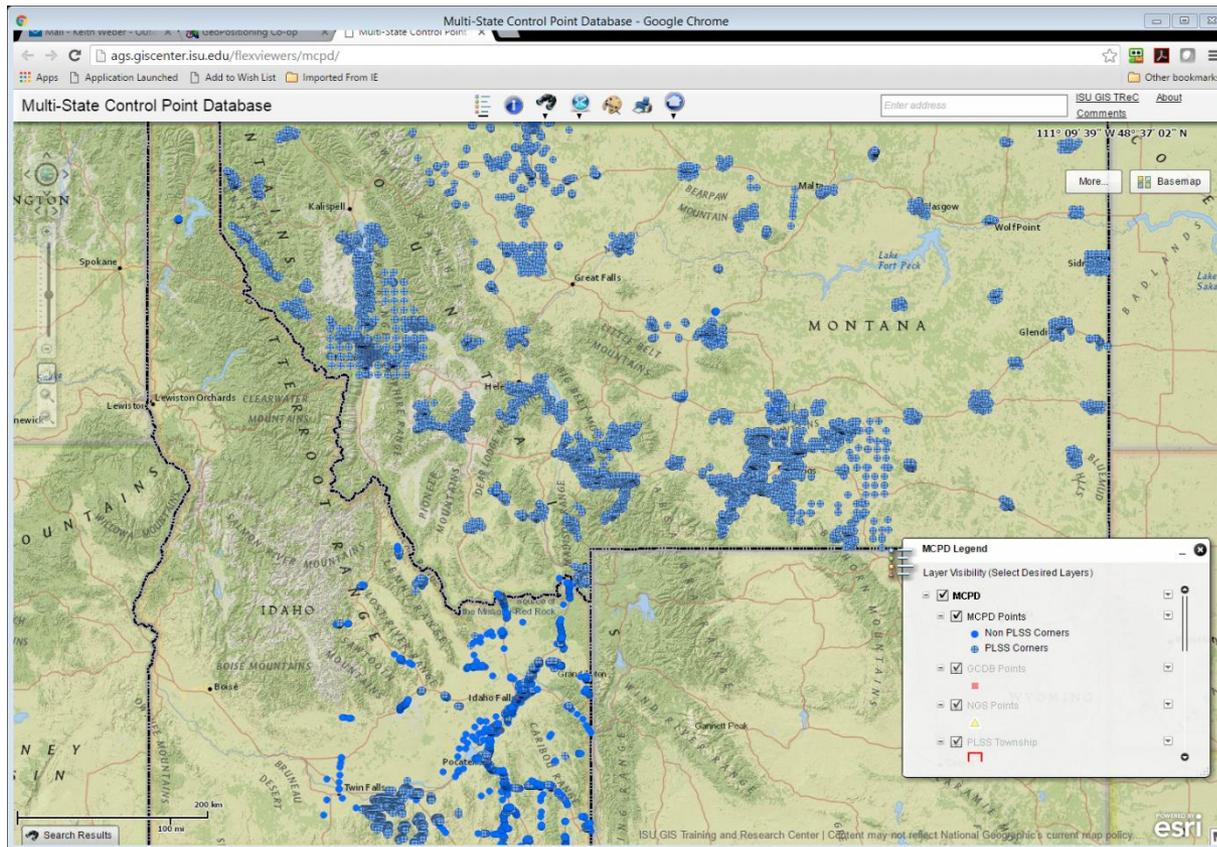
- Real-time GNSS network
  - Established a collaborative relationship with Utah's TURN



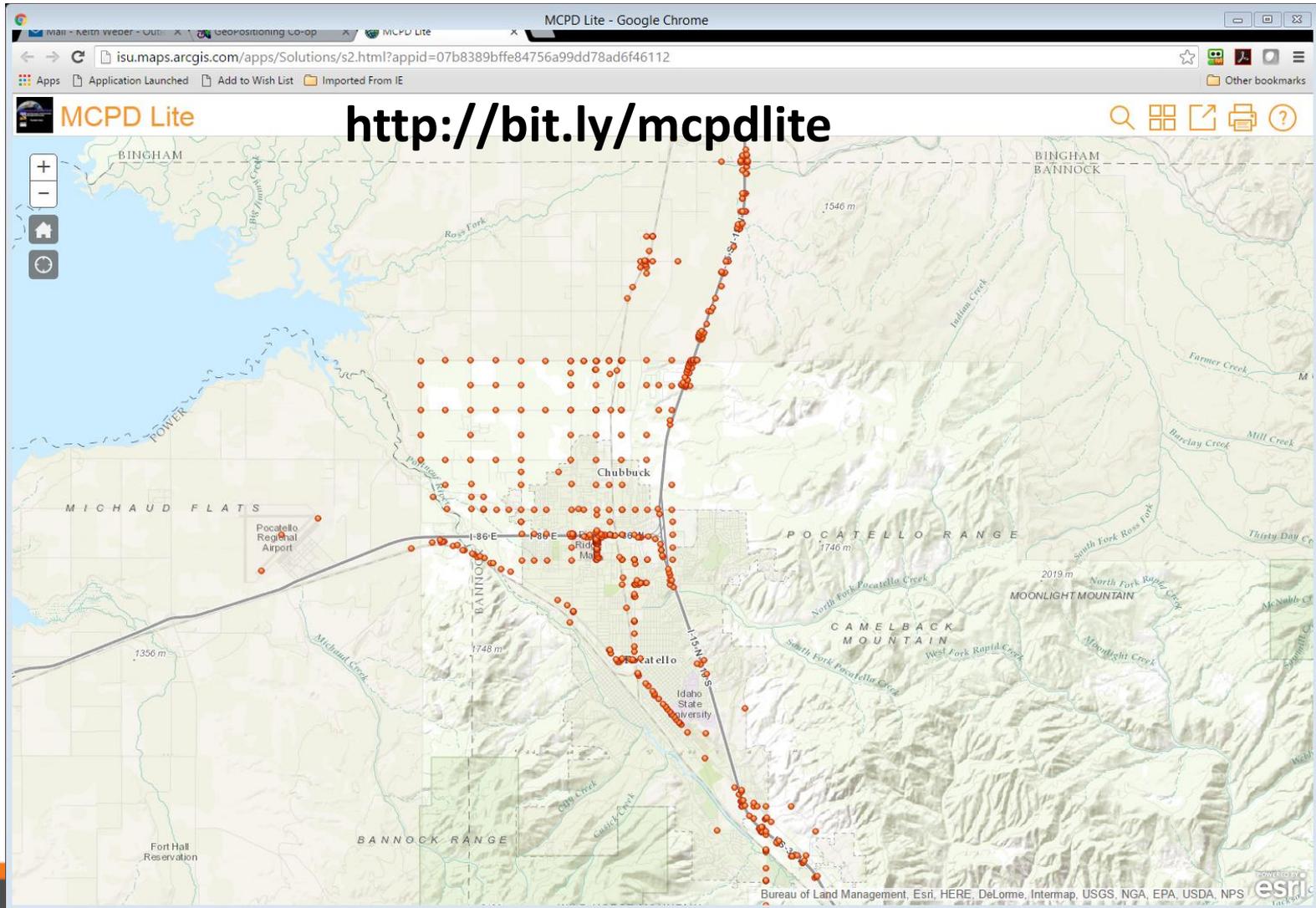
# Topics/Focus

- The Multi-state Control Point Database (MCPD)
  - Located and maintained at ISU's GIS TReC
  - MCPD data steward, Dr. Kazi Arifuzzaman
- Provides a web interface to research, reference, and download control points

# MCPD Web Map (desktop)



# MCPD Lite (Mobile-friendly)



# Control Points

- Since November 2015, the GC-TWG has been busy working on a Control Point standard

## **Appendix D: Glossary**

Control Point: An existing physical monument established by survey methods describing the horizontal and/or vertical position of the monument.

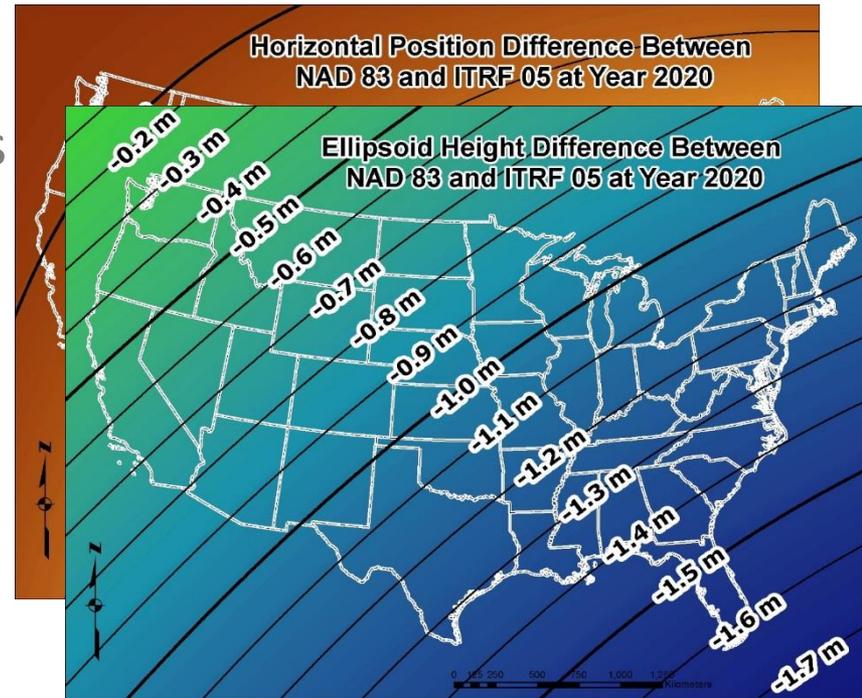
# Why a Control Point Standard?

## 2.2. Need

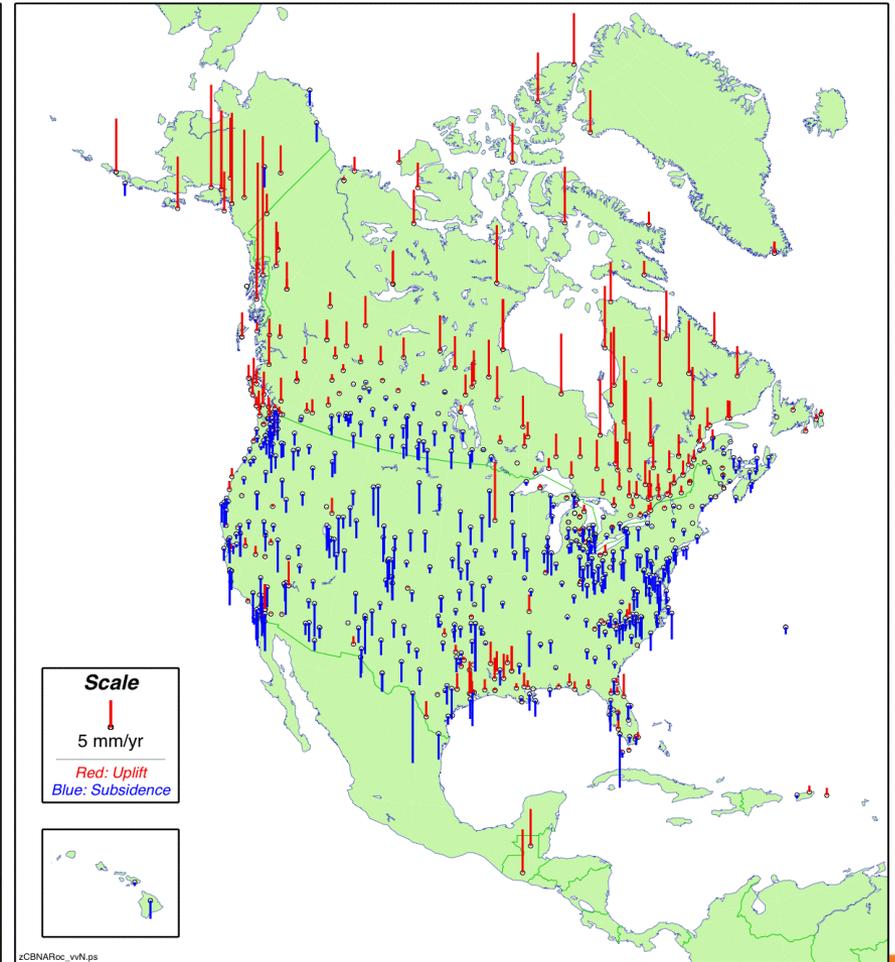
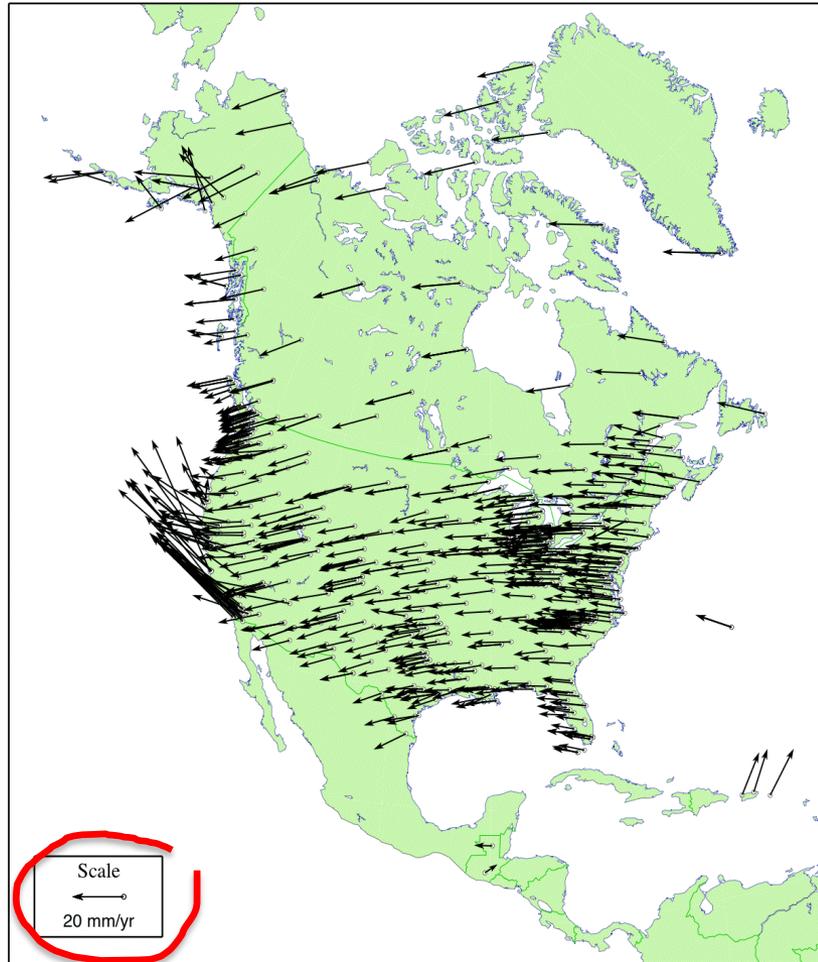
The Control Point Standard is a key standard for city and county GIS managers, land managers, community and business development, infrastructure management, and research. This standard provides an elemental foundation for not only the consistent depiction of mapping and engineering features, but information describing those features as well as centralized access to existing control points and their stewardship.

# The Earth is Moving

- Abrupt events: earthquakes
- Continuous events: Plate tectonics
  - Horizontal and vertical



# Direction of Movement



# About 20mm/year (Horizontal)

- Benchmark monumented in 1962
  - Northing in 1962: 129980 m
  - Easting in 1962: 180110 m
- Movement in 54 years
  - 1080 mm or 1.08 m
- Horizontal position in 2016
  - Northing: approx. 129979 m
  - Easting: approx. 180109 m

```
NU0168 *****
NU0168 DESIGNATION - H 98 RESET
NU0168 PID - NU0168
NU0168 STATE/COUNTY- ID/BANNOCK
NU0168 USGS QUAD - POCATELLO SOUTH (1974)
NU0168
NU0168 *CURRENT SURVEY CONTROL
NU0168
NU0168* NAD 83(1986)- 42 50 12. (N) 112 24 36. (W) SCALED
NU0168* NAVD 88 - 1382.89 (+/-2cm) 4537.0 (feet) VERTCON
NU0168
NU0168 GEOID HEIGHT- -12.53 (meters) GEOID99
NU0168
NU0168 VERT ORDER - THIRD (See Below)
NU0168
NU0168.The horizontal coordinates were scaled from a topographic map and have
NU0168.an estimated accuracy of +/- 6 seconds.
NU0168
NU0168.The NAVD 88 height was computed by applying the VERTCON shift value to
NU0168.the NGVD 29 height (displayed under SUPERSEDED SURVEY CONTROL.)
NU0168.The vertical order pertains to the superseded datum.
NU0168
NU0168.The geoid height was determined by GEOID99.
NU0168
NU0168; North East Units Estimated Accuracy
NU0168;SPC ID E - 129,980. 180,110 MT (+/- 180 meters Scaled)
NU0168
NU0168 SUPERSEDED SURVEY CONTROL
NU0168
NU0168 NGVD 29 - 1381.84 (m) 4533.6 (f) RESET 3
NU0168
NU0168.Superseded values are not recommended for survey control.
NU0168.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
NU0168.See file dsdata.txt to determine how the superseded data were derived.
NU0168
NU0168_MARKER: DD = SURVEY DISK
NU0168_SETTING: 66 = SET IN ROCK OUTCROP
NU0168_STAMPING: H 98 RESET 1962
NU0168_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD
NU0168+STABILITY: POSITION/ELEVATION WELL
NU0168
NU0168 HISTORY - Date Condition Recov. By
NU0168 HISTORY - 1962 MONUMENTED IDDT
NU0168
NU0168 STATION DESCRIPTION
NU0168
NU0168'DESCRIBED BY ID DEPT OF TRANSP 1962
NU0168''2.7 MI S FROM POCATELLO.
NU0168''FROM THE COURTHOUSE IN POCATELLO SOUTH ALONG U.S. HIGHWAY 91 FOR 2.7
NU0168''MILES TO REMERS GARAGE AND CAFE AND THE BENCH MARK IS TO THE WESTWARD
NU0168''ON THE TOP OF THE LAVA BENCH, 145 FEET SOUTHWEST FROM ITS NORTHEAST
NU0168''EDGE, 9.7 FEET EAST FROM A METAL WITNESS POST WITH SIGN, CEMENTED IN A
NU0168''DRILL HOLE OF THE BEDROCK WHICH PROJECTS 2 INCHES ABOVE THE GROUND
NU0168''SURFACE. NOTE-- THIS MARK IS LOCATED 228 FEET NORTH OF THE OLD
NU0168''LOCATION IN LAVA ROCK.
```

# Today...

- Control points are digital “benchmarks” or monuments
- The foundation for all other GIS data
- Absolutely critical to building a Idaho’s SDI
- To be done consistently, a standard is needed

# GC-TWG

- The GC-TWG has recently approved the DRAFT Control Point Standard to be reviewed by IGC and IGC-EC
- We encourage all stakeholders to review the DRAFT standard and send comments to:
  - [webekeit@isu.edu](mailto:webekeit@isu.edu) or [giscenter@isu.edu](mailto:giscenter@isu.edu)
- Questions?

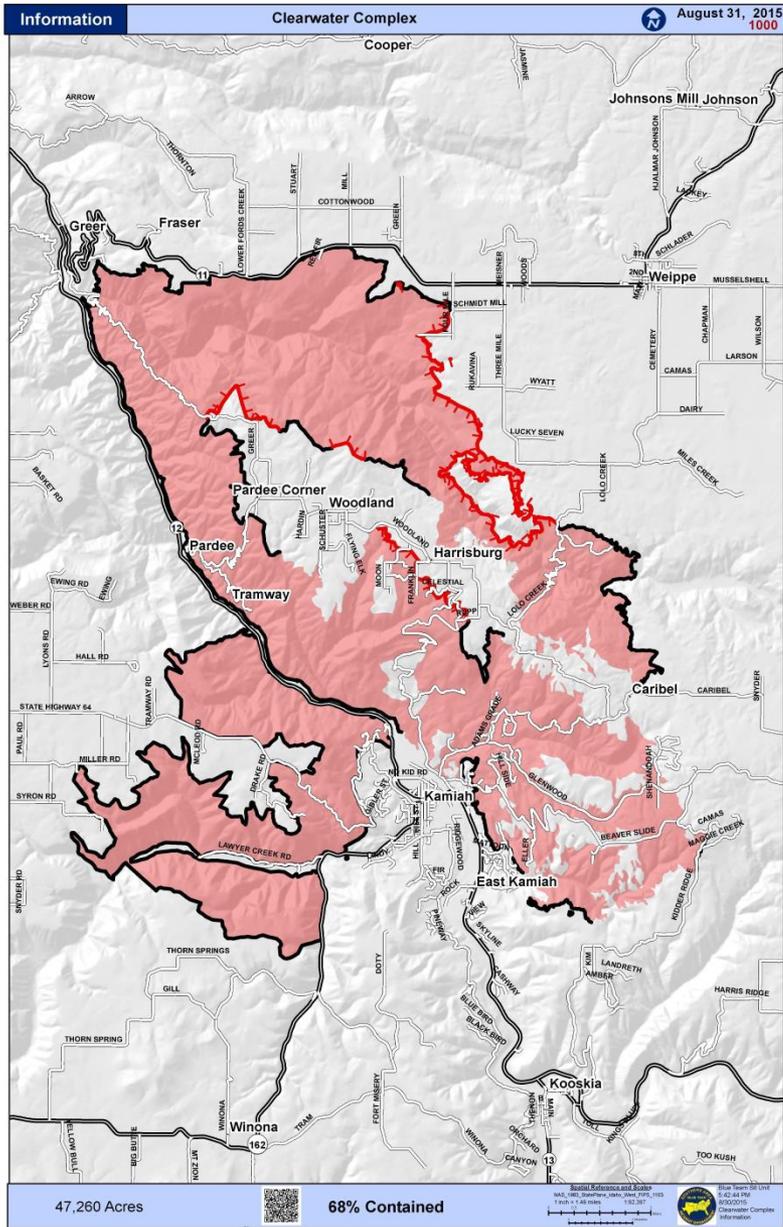
# Idaho Public Safety TWG



# Idaho Public Safety

- Data Standards
  - Emergency Service Zones
  - Structures and Landmarks
- 911 & Emergency Management
  - 911 daily GIS map usage
    - 911, CAD, AVL, Radio, mobile, call notification, crime
    - Next Generation 911
  - EM – mitigation, planning, disasters, recovery
    - Regional data – data sharing - MOUs
    - Pre-incident map templates
  - Idaho Public Safety Communications Commission
- Digline – Damage Prevention Board

# Idaho Public Safety



Future Discussion  
Regional Datasets  
Next Generation 911  
Base layers  
Mapping in an emergency

Bill Reynolds

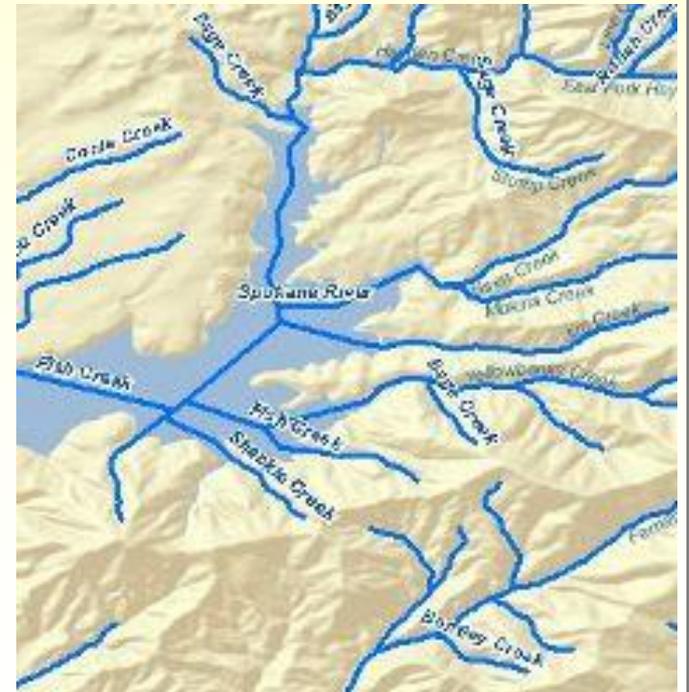
[billr@co.nezperce.id.us](mailto:billr@co.nezperce.id.us)

208-750-2055

# Hydrography

CHAIR: Linda Davis

- ✓ Stewardship
- ✓ Data Integration
- ✓ Resources and Tools



# Hydrography Technical Working Group (TWG)

**Next Meeting: Sept. 8, 2016**

**Last meeting: March 10, 2016**

- Full minutes: <http://idwr.idaho.gov/GIS/NHD/hydro-TWG.html>

## **Treasure Valley Updates and Discussion**

- IDWR update to the National Hydrography Dataset for HU 17050114 is completed.
- DEQ presented on mapping effort to look at where water goes as well as where it comes from.
  - Irrigation Interests usually don't track where water goes.
  - Built network to develop "drain sheds" to help coordinate water quality efforts
- Discussion on future efforts
  - Need larger scale
  - NHD mostly used for cartography
  - Water Quality interests looking for more info/attribution to use in their projects

# Hydrography Technical Working Group (TWG)

## Watershed Boundary Dataset (WBD)

- The WBD vs. NHDPlus v. 2 Catchments
- Editing the WBD
- WBD Future Plans

## National Hydrography Database (NHD)

- In testing is a Provisional Name Tool for submitting new names for hydrography to the Board of Geographic Names
- Current IDWR Projects: Big Lost (17040218) and Lemhi (17060204) Basin

## NHD Web Services:

<http://services.nationalmap.gov/ArcGIS/rest/services/nhd/MapServer>

## For More Information:

<http://idwr.idaho.gov/GIS/NHD/datasets.html>

Danielle Favreau (208) 287-4800 [nhd.wbd@idwr.idaho.gov](mailto:nhd.wbd@idwr.idaho.gov)

# Hydrography Technical Working Group (TWG)

## NHDPlus HIGH RESOLUTION

- **Using:**
  - NHD High Res
  - WBD
  - 10 m DEMs (NED or LiDAR)
  - Ancillary: GNIS
- **Updating NHD :**
  - Network Adjustments/Improvements
- **Process:**
  - Adapting NHDPlus v.2 Tools
  - Automation
  - Iterative Process
    - including refresh
  - Generalization
- **Updating WBD:**
  - GNIS Names Review
  - Overlapping NHD/WBD at 4 digit level

**Timeline: Cont. US first round completed 2018**

- **For More Information:**

<http://idwr.idaho.gov/GIS/NHD/hydro-TWG.html> - First Presentation

Al Rea – NHDPlus High Resolution Update

- Danielle Favreau (208) 287-4800 [nhd.wbd@idwr.idaho.gov](mailto:nhd.wbd@idwr.idaho.gov)

# Nominating An Authoritative Dataset

IGC MEETING  
June 14, 2016

Danielle Favreau  
IDWR



# What Does It Mean?

Authoritative

Available

Authority Distribution

Open Datasets Compilation

Current Distributor Framework

Data

Agree Certified Free

Documented Best Standard

Sources Scale Limitations Recognized

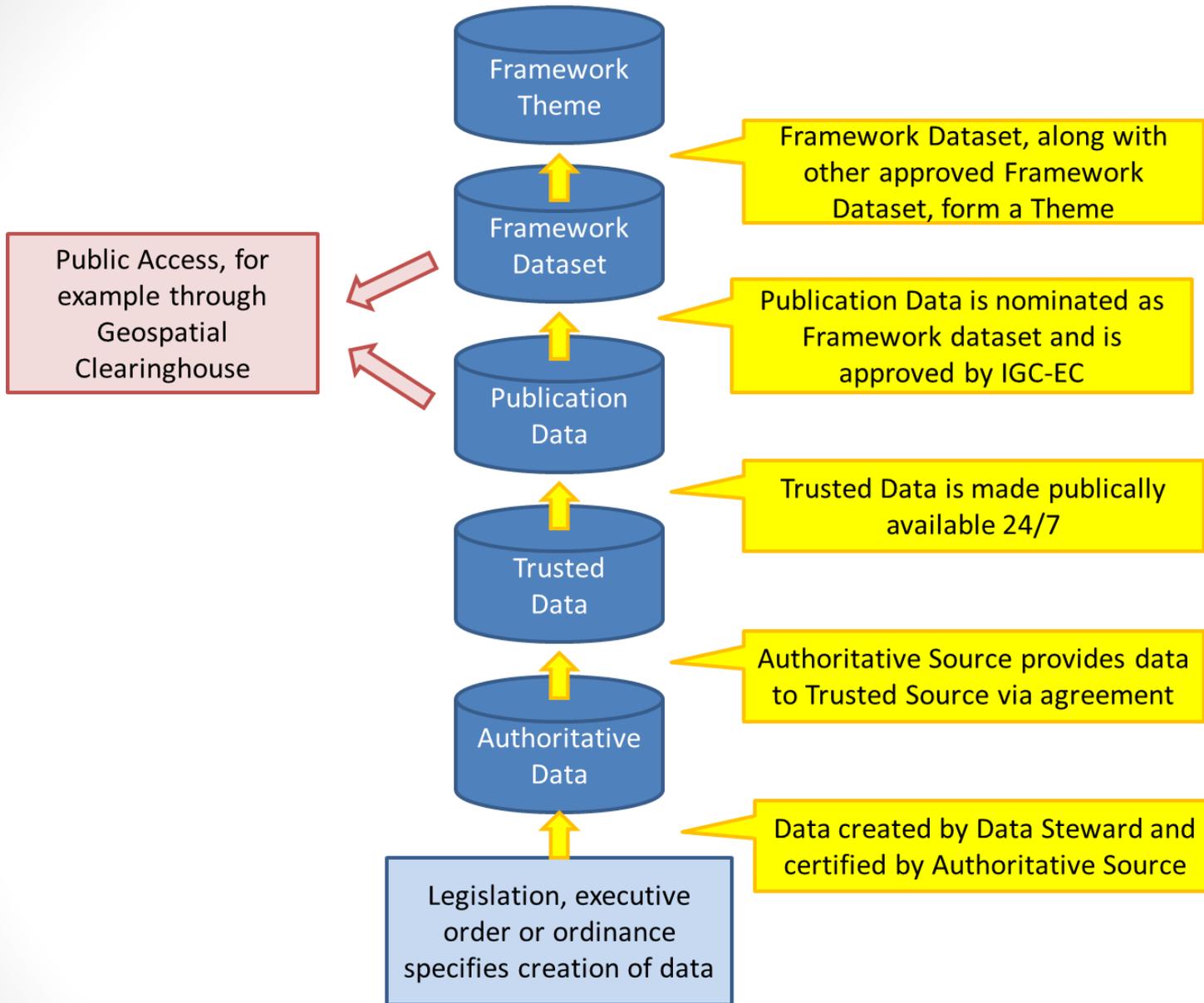
Trusted Complete Gold Authorized

Accurate Legal Dataset

Precise Guidelines Informative

Methodology

Source





# Framework Dataset Nomination

- Nominee:
- Framework Data Theme:
- Framework Dataset/Element:
- Proposed Framework Dataset Name:
- What Dataset do you want to nominate?



# Timeline

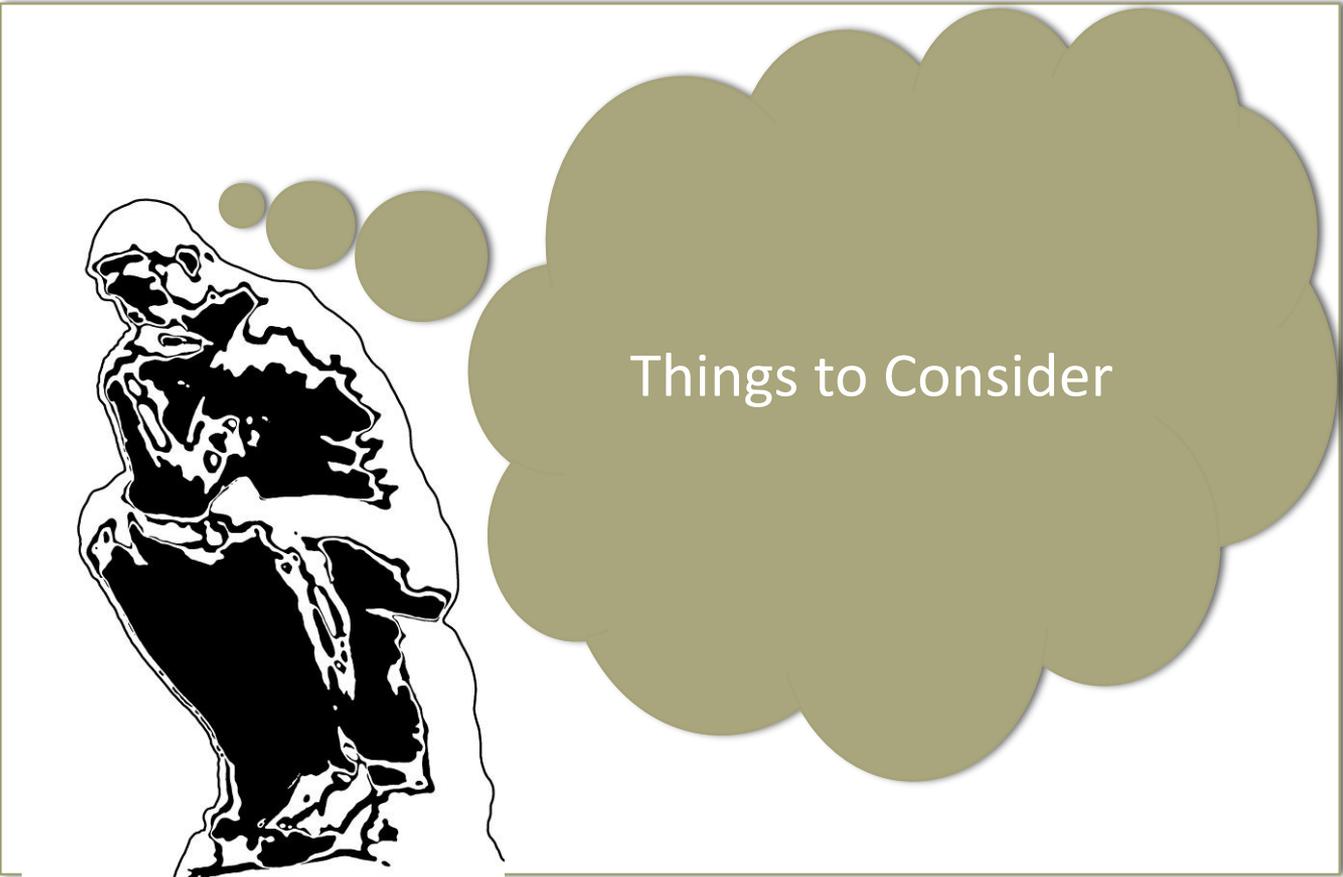
- A nomination is presented at IGC-EC.
  - Nomination goes before IGC-EC Chair
- IGC-EC Chair sends the nomination back to the TWG for formal recommendation
  - If no TWG, Chair convenes one.
  - Email goes out to IGC
- TWG meets and makes formal recommendation
  - Discussions documented in TWG Minutes.
- If recommendation is to approve nomination, nomination presented to IGC-EC.
  - If IGC-EC approves
- Presentation made at IGC
  - Last chance for comments!
- Nomination presented to IGC-EC for final vote and “framework stamp”.

# Characteristics of a Framework Dataset

- Published by a Trusted Source
- Documentation of Authoritative Sources
- Complete Metadata
- Publication Data in an approved and defined data exchange format
- Detailed maintenance /update schedule

# Characteristics of a Framework Dataset

- Prefer 1:24000
- Statewide coverage or with incorporation methodology
- Prefer tie to National Dataset

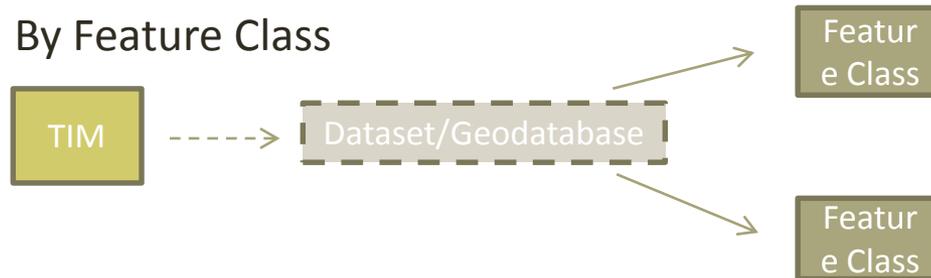


Things to Consider

# Data Description!

## Nomination Type

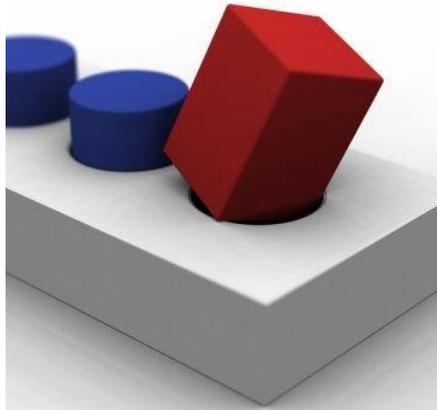
- By Feature Class



- By Dataset



# Data Exchange Standards



<http://gis.idaho.gov/portal/coordination/standards.html>

# Inclusions/Exclusions?

| Name                | Type                               |
|---------------------|------------------------------------|
| HYDRO_NET           | File Geodatabase Geometric Netw... |
| HYDRO_NET_Junctions | File Geodatabase Feature Class     |
| NHDArea             | File Geodatabase Feature Class     |
| NHDAreaEventFC      | File Geodatabase Feature Class     |
| NHDFlowline         | File Geodatabase Feature Class     |
| NHDLine             | File Geodatabase Feature Class     |
| NHDLineEventFC      | File Geodatabase Feature Class     |
| NHDPoint            | File Geodatabase Feature Class     |
| NHDPointEventFC     | File Geodatabase Feature Class     |
| NHDWaterbody        | File Geodatabase Feature Class     |

| Name     | Type                           |
|----------|--------------------------------|
| WBD_HU8  | File Geodatabase Feature Class |
| WBD_HU6  | File Geodatabase Feature Class |
| WBD_HU4  | File Geodatabase Feature Class |
| WBD_HU2  | File Geodatabase Feature Class |
| WBD_HU16 | File Geodatabase Feature Class |
| WBD_HU14 | File Geodatabase Feature Class |
| WBD_HU12 | File Geodatabase Feature Class |
| WBD_HU10 | File Geodatabase Feature Class |



# Stewardship/ Maintenance Plan

- Include:
  - Detailed maintenance/update schedule.
  - Methodologies for developing/incorporating other data.
- Is there already a plan on a national level in place?
- Idaho Stewardship Plan Template:  
<http://gis.idaho.gov/portal/pdf/Stewardship/PlanTemplate.pdf>

# Framework Dataset Nomination



# QUESTIONS?

Danielle Favreau  
IDWR

[Danielle.Favreau@idwr.idaho.gov](mailto:Danielle.Favreau@idwr.idaho.gov)



Take a break...





IDAHO FISH AND GAME  
preserve • protect • perpetuate

# Elk & Mule Deer Habitat Suitability Models

Pam Bond, GIS Analyst



**Powered by IFWIS**  
Idaho Fish & Wildlife Information System

# Data-driven Modeling

Prior statewide mule deer and elk habitat maps was created using a Delphi (expert opinion) approach via workshops

WAFWA & USU, 2005 [http://www.gis.usu.edu/current\\_proj/muledeer.html](http://www.gis.usu.edu/current_proj/muledeer.html)

RMEF, 2006 <http://www.arcgis.com/home/item.html?id=4e3028a9e37a4f57a8b1020c0141caca>

Senior wildlife research biologists (Scott Bergen, Jon Horne, and Mark Hurley) used the maximum-entropy approach (Maxent) to model elk and deer habitat.

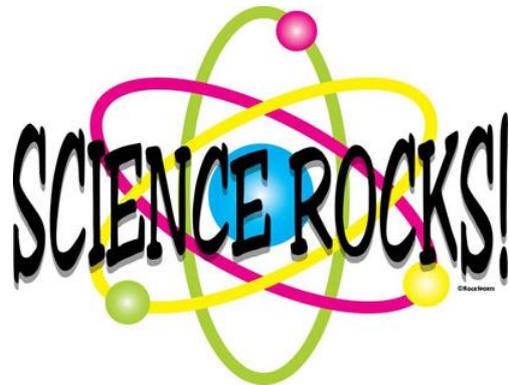
<https://www.cs.princeton.edu/~schapire/maxent/>



# Model Development

**Models created only in those areas with adequate data.**

***Scientifically Feasible  
& Defensible***



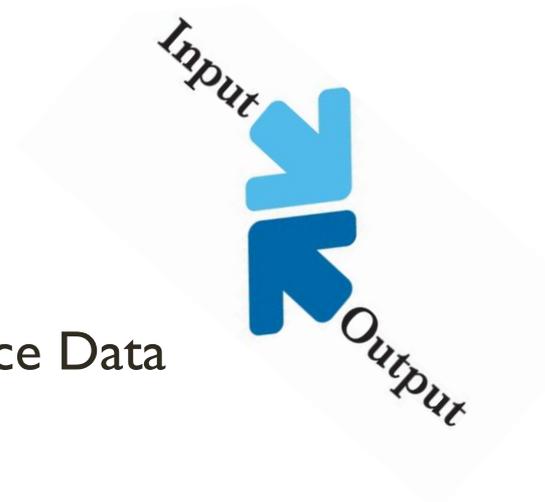
# Maxent

- **Inputs:**

- Environmental Variables
- Georeference Occurrence Data

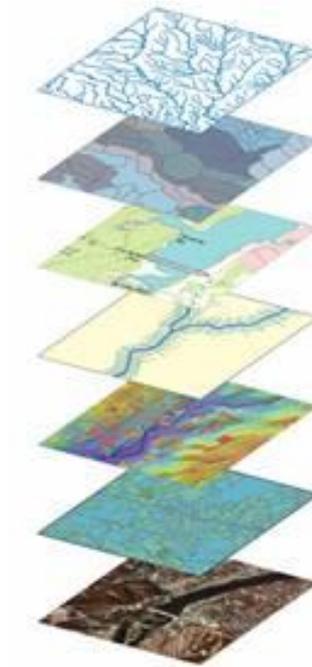
- **Output:**

- Estimated probability of an area being seasonal habitat
  - 0 = very low probability
  - 1 = high probability



# Inputs – Environmental Variables

- Elevation
- Aspect
- Slope
- Terrain Position Index
- Vegetation Cover
- Fire Occurrence
- NDVI
- Max Snow Depth



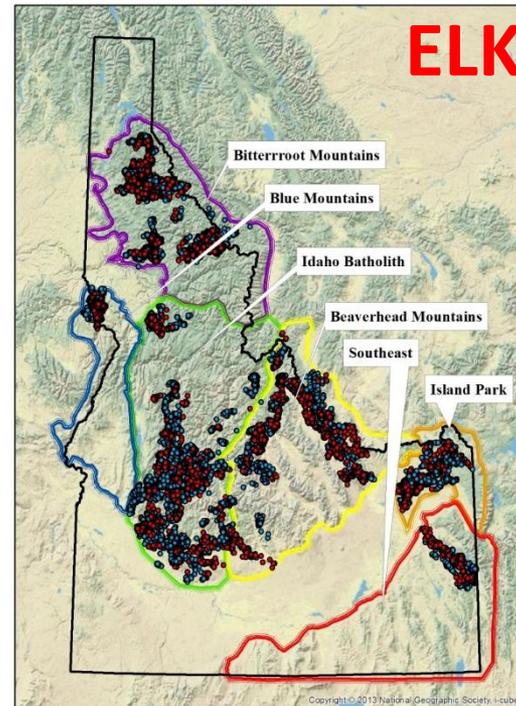
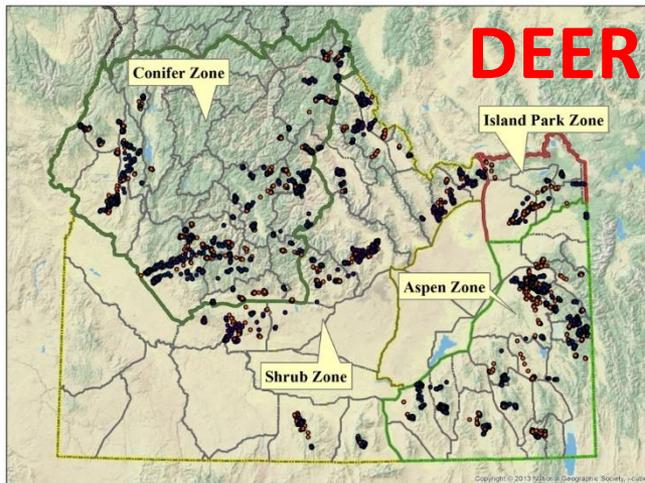
# Inputs – GPS Collar Data

- 2 GPS Locations Per Week
- Separated by Season
  - **Winter** → January 1 to April 30
  - **Spring Migration** → May 1 to May 31
  - **Summer** → July 1 to August 31
- 60:40 ratio classified into training and validation datasets



# Inputs – Ecological Regions

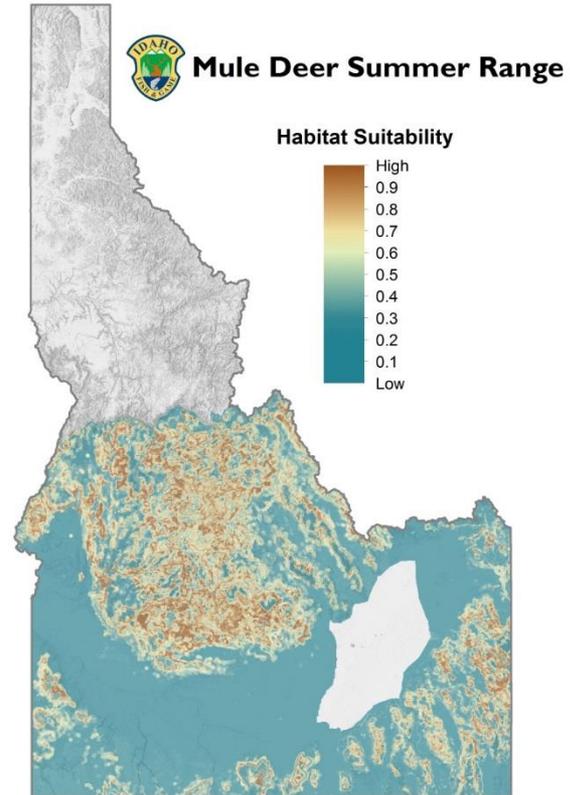
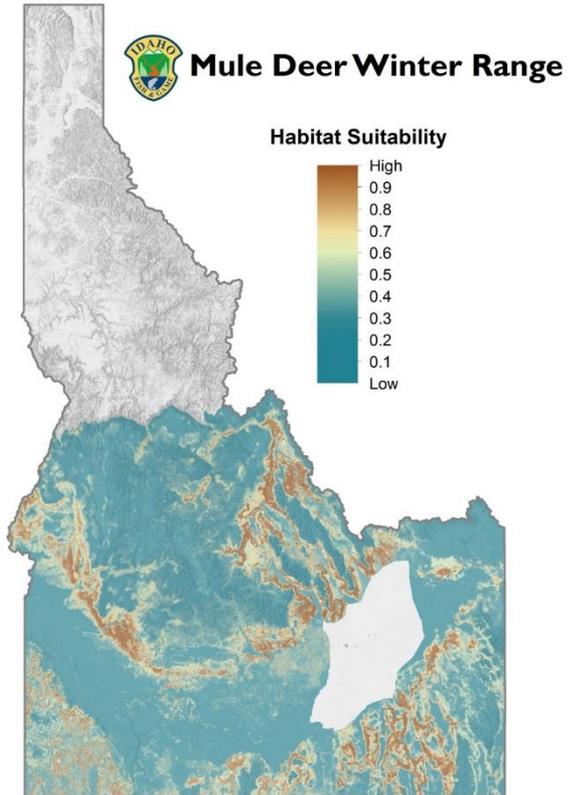
**Different models  
for different  
ecological regions.**



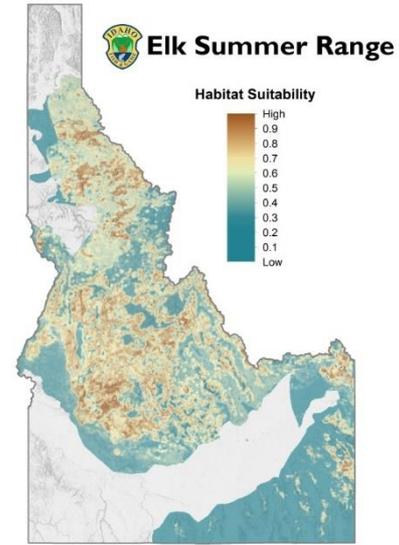
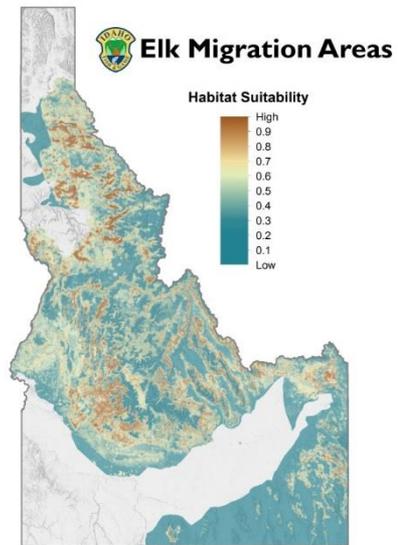
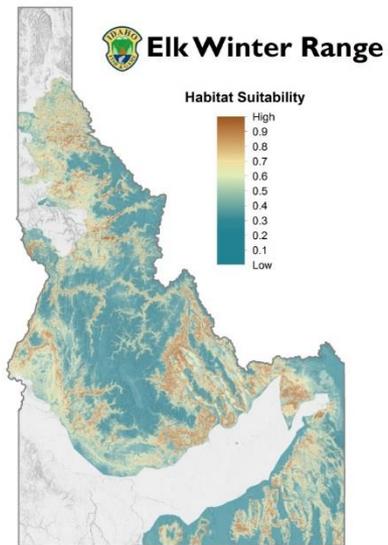
# Caveats & Limitations

- Areas without location data or poor location data spread should be considered experimental (but still best available).
- Summer range estimates are biased towards early summer locations (deer specific)
- Both: vegetation and habitat image data is from 2004.

# Outputs



# Outputs





# State **GIS** Strategic Plan Revision

- Past version was published in 2009
- 2009 version was 79 pages, 2016 revision is 10 pages long
- 2016 version focuses on goals and objectives for the next 5 years, no business plan
- 2016 version doesn't have as many specifics, like implementation timing
- Plan to review annually

# State **GIS** Strategic Plan Revision

- **GIS** Community Survey
  - Guiding Principles
  - Strengths
  - Weaknesses
  - Opportunities
  - Challenges



# State GIS Strategic Plan Revision

## Strengths:

- Existing statewide GIS organizational structure addresses many important coordination issues
- Effective, long-term use of GIS technology in many state agencies
- Large, knowledgeable community of GIS users throughout the state
- Active GIS user groups in some regions
- Current state GIS clearinghouse (INSIDE Idaho) provides many of the SDI services needed for the future
- Undergrad and graduate GIS courses and degree programs at the universities (also GIS Certificates are available)

## Weaknesses:

- State government IT planning and management is highly decentralized without sufficient level of central coordination and authority
- Organizational structure does not provide adequate level of authority for GIS standards and policy approval and adoption
- Lack of a comprehensive set of Framework geospatial data standards limits database consistency and statewide development
- Organizational and political barriers present obstacles to collaboration and consensus
- State legislated cap on annual budget increase for local governments inhibits fund allocation for GIS initiatives

## Opportunities:

- GIS is an accepted "core information technology" and is effective in enabling information and organizational integration
- New technology tools and procedures lower costs for GIS database compilation
- INSIDE Idaho could be basis for enhanced geospatial portal
- Extensive GIS educational offerings in the state higher education system support future training and professional development
- Professional and industry associations are potential "allies" in garnering support and creating heightened awareness for the SDI
- Increased demands by the public for information from government agencies create potential role for GIS

## Challenges:

- Geographic disparity in resources limits GIS development and operation in low-resourced jurisdictions
- Insufficient availability of qualified staff and frequent staff turnover and low wages for competent technical and management personnel
- Maintaining involvement and coordination among stakeholder organizations statewide
- Establishing awareness and keeping the interest and support from senior officials
- Ongoing funding Sprawling geography
- Keeping regional efforts aligned

# State **GIS** Strategic Plan Revision

**1: Create/support a robust geospatial data clearinghouse for sharing current and historical TIM framework and other authoritative data layers.**

- Increased funding/manpower needed to make this happen.
- INSIDE Idaho or other option.

# State **GIS** Strategic Plan Revision

## 2: Provide best available statewide TIM framework data layers.

- Increase # of formally recognized TIM framework datasets.
- TIM nomination and metadata workshops
- Brand TIM datasets

# State **GIS** Strategic Plan Revision

## 3: Improve geospatial data quality.

- Encourage use of services to improve availability and currentness
- Education on proper metadata

# State **GIS** Strategic Plan Revision

## 4: Improve delivery and accessibility of GIS services and information.

- Leverage user-friendly map applications
- Encourage the use of mobile-friendly templates

# State **GIS** Strategic Plan Revision

## **5: Increase stakeholder awareness of GIS data access, availability, and usability.**

- Increase publicity of geospatial data clearinghouse and user-friendly maps and apps.

# GIO Update

Bill Farnsworth

- Data Exchange Standard S4250
- ArcGIS Online 127 Users 30 Agencies
- Upcoming Esri UC
- Open Data Portals
- More GIS at IT meeting
- Interest in GIS on SharePoint

# Adjournment

*Details coming soon for the  
Fall **2016 IGC** Meeting*