

# DATA ACQUISITION PROJECTS

May 2022

**Ashley Summers, Information Systems Manager** 

### AGENDA

• High-level timeline

- Status updates for
  - Imagery 2022
  - Lidar 2020
  - Planimetric Data 2020
  - Land Cover 2020
- Program update
- Best Practices for Using Imagery in ArcGIS Online Justin Wells, ESRI





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## **IMAGERY 2022**



## IMAGERY 2022

We have two offerings for imagery in 2022

- A custom flight similar to collections from 2002-2020
- A supplemental Nearmap imagery subscription (metro area only)



### **IMAGERY 2022 – CUSTOM FLIGHT**



#### What's the same?

- approximately 6,000 square miles of collection
- four-band orthoimagery
- snow-free and leaf-off flight timing
- meets American Society for Photogrammetry and Remote Sensing positional accuracy standards for mapping and geographic information systems work
- independent quality control provided by partners and volunteers
- Vendor is The Sanborn Map Company (since 2016)
- Delivery timing, methods, and options  $\leftarrow$  including a 2022 WMS

### **IMAGERY 2022 – CUSTOM FLIGHT**

### What's new?

- Additional ground control (check points) for our independent verification of positional accuracy.
- A true-ortho process in areas historically affected by building lean errors
- No historical imagery services
- Web Mercator as a new projection option? (still working out these details)

### MAGERY 2022 – PROGRESS ON CUSTOM FLIGHT

#### Spring flight window

**Adress** 

- Area 1a 95% complete
- Area 1 80% complete
- Area 2 complete

**Issue**: unacceptable amount of snow remains in the foothills.

**Solution**: extend spring flight window and capture/process remaining imagery separately.

**Considerations**: may affect radiometric differences at seamlines (positively); may be processed after the other spring imagery to protect the project schedule.

#### Summer flight window

• Area 3 - incomplete





### **Aesthetics survey**

- Why: to give direction to Sanborn on our radiometric preferences (specifically contrast and brightness).
- How: online questionnaire sent to partners on 4/20.
- When: Due 5/6

### **IMAGERY 2022 - NEARMAP**

- Supplemental 2-year subscription
  - Unlimited users and usage for your organization to vertical imagery service
  - Four flights during the term (Spring 2022, Fall 2022, Spring 2023, Fall 2023)
  - Two on-prem deliveries that are perpetually licensed (Fall 2022 and Spring 2023)
  - Use restrictions but available to share with contractors
- Options for buy-ups
  - Public display licenses
  - Al packs (auto-generated planimetrics)
  - 3D ("phodar")
  - Obliques

How do these buy-ups compare to products from DRCOG's planimetric and lidar projects?

### **IMAGERY 2022 – PROGRESS ON NEARMAP FLIGHTS**

 Meeting between partners and Nearmap account representative on 4/13 to discuss licensing rules and new MapBrowser features.

 Nearmap flight 1 of 4 was collected on March 25, 2022. If you are receiving offline copies, they are expected in late May.



### **LIDAR 2020**

1.10





### LIDAR DELIVERABLES



Approximately 5,000 square miles of lidar was collected between May 26, 2020 and September 7, 2020.

Deliverables were captured according to <u>U.S. Geological Survey</u> <u>Lidar Base Specifications</u>.

By the numbers	
Value of data	\$1.4 million
Number of partners	33
QL 1 lidar	294 square miles
QL 2 lidar	4,596 square miles
Contours	3,890 square miles



- Infrastructure failure at Sanborn required data recovery.
- USGS review backlog was 3x longer than normal.
- Contour processing was more difficult and time-consuming than expected.

• **Bottom line** = specifications were met but the deliverables in the metro area were 6 months (point clouds, dems) to 10 months (contours) late.



### CHALLENGES

- Contours originally delivered in February 2022 used the incorrect methodology and had to be reprocessed.
- Corrected metro deliveries
  - Row 1 & 2 Mar 22
  - Row 3 Mar 25
  - Row 4 Apr 7
  - Row 5 May 3
  - Row 6,7,8,9,10,11 expected May 13
- Corrected mountain deliveries
  - Expected by Jun 3





- Quality product approved by USGS
- Regional coverage
- Local, state, and federal funding contributions
- Public domain data access

By the Numbers	
Value of data deliverables	\$1,437,000
Total number of project partners	33
Quality Level 1 lidar acquired	294 square miles
Quality Level 2 lidar acquired	4,596 square miles
1-foot and 2-foot contours generated	3,890 square miles



### ACCESSING DATA

Resource	Products	Projection	How to Access
DRCOG Regional Data Catalog	Point clouds DEMs Contours	Colorado State Plane Central and North	<u>Download</u>
Colorado Water Conservation Board	Point clouds DEMs		<u>Download</u>
Colorado Governor's Office of Information Technology	Point clouds DEMs DSMs Breaklines Intensity rasters	Colorado State Plane Central and North	Email request
USGS National Map	Point clouds DEMs	UTM	<u>Download</u>



### **ACCESSING DATA – REGIONAL DATA CATALOG**

- 1. Navigate to data.drcog.org
- 2. Search for "lidar" or go to the Data tab and turn on the "Regional Lidar" filter.
- 3. Select dataset based on quality level and projection.
- 4. Select a tile from the preview map and download data from the pop-up.

5. Download the extent shapefile and metadata from "Get Data."

#### PROGRAM

Regional Land Cover

- 🗹 Regional Lidar
- Regional Planimetrics

Denver Regional Aerial
 Photography Project



IBUTES ×	GET DATA
72 CSPC_Q2 I1E266	Shapefile GeoJSON
<sub>ge:</sub> lidararchive <sub>Name:</sub> lidar_index_cspc_q2	KML
1E266.las 1E266.tif	XML Metadata
1E266.tfw	Supplemental Infor

mation



### THANK YOU TO OUR PARTNERS!

- 1. U.S. Geological Survey
- 2. Colorado Water Conservation Board
- 3. Denver Water
- 4. Mile High Flood District
- 5. Adams County
- 6. Clear Creek County
- 7. City and County of Denver 19.City of Commerce City8. Douglas County 20.City of Englewood
- Douglas County
   Cilmin County
- 9. Gilpin County
   10.Jefferson County
- 11.City of Arvada

12.City of Aurora 13.Tow of Bennett 14.City of Boulder 15.City of Brighton **16.Town of Castle Pines** 17.Town of Castle Rock 18.City of Centennial 20.City of Englewood 21.Town of Frederick 22.City of Golden 23.City of Greenwood Village

24.City of Lafayette 25.City of Lone Tree 26.City of Longmont 27.City of Louisville 28. Town of Morrison 29.Town of Parker 30. Town of Superior 31.City of Thornton 32.City of Westminster 33.City of Wheat Ridge

Expect a satisfaction survey soon!



## PLANIMETRIC DATA 2020 & 2022



### **Basic Package**

- Building roofprints
- Edge of pavement
- Parking lots
- Sidewalks (+ widths for partners)
- Trails

### **Buy-ups**

- Driveways
- Impervious surface





#### **Expanded extent**

The partnership expanded the project area to include Jefferson County, which increased the collection area to almost **1600 square miles** from approximately 1200 square miles.

#### **Attribution for asset management**

To help with asset management, a **persistent identification number** was added to the building, parking, driveway, and sidewalk ramp layers. This new attribute will allow local government staff to track these features as they are built, modified, and replaced over time.

#### **Student volunteers for quality control**

DRCOG partnered with the GeoEx program at the Front Range Community College to have student volunteers assist DRCOG partners with quality control of the final products. **Thirteen students** participated in this effort over 8 months. Their work ensured that the datasets met our specifications while relieving our partners of this time-consuming task.

By the numbers		
Value of data	\$287,000	
Number of partners	20	
Square miles covered	1,600	
Features captured	8	



### **SURVEY RESULTS**

	Very Good	Good	Fair	Poor
Overall experience	64%	36%		
Communication	91%	9%		
Quality	55%	45%		
Timing of deliverables	18%	64%	18%	
DRCOG's performance	91%	9%		
Kucera's performance	36%	55%	9%	

64% of respondents would like to use Kucera again in the future.



### **ACCESSING DATA – REGIONAL DATA CATALOG**

- Navigate to 1. data.drcog.org
- 2. Search by feature name or go to the Data tab and turn on the "Regional Planimetrics" filter.

#### PROGRAM

Regional Land Cover

- Regional Lidar
- Regional Planimetrics
- Denver Regional Aerial Photography Project

3. Sort by "Data Vintage" to see the 2020 data at the top of the list.

4. Select a dataset.

#### **BUILDING ROOFPRINTS 2020**

Data Vintage: Apr 2022 Date Modified: Apr 2022 Original Sources: DRCOG Terms of Use

5. Download the shapefile and xml metadata from Get Data.





### THANK YOU TO OUR PARTNERS!

Arapahoe County
 City and County of

Denver

3. Jefferson County

4. City of Arvada

5. City of Aurora

6. Tow of Bennett

7. City of Boulder

8. Town of Castle Rock

9. City of Dacono

10. Town of Erie 11.Town of Frederick 12.City of Golden 13.City of Greenwood Village 14.City of Littleton 15. Town of Morrison 16.City of Wheat Ridge **17.Mile High Flood** District

18.South Metro Fire Rescue
19.Prospect Recreation and Park District
20. Denver Regional Council of Governments



### PLANIMETRIC DATA 2022

### How to participate

- Potential partners were sent quotes for participation in the 2022 project in April. Didn't get a quote and want one? Contact Ashley at <u>asummers@drcog.org</u>.
- Commitments (i.e., signed letters of intent) are due in Q4 of 2022.
- Project is estimated to occur from February 2023 February 2024.
- Payment can be submitted in December 2022, anytime in 2023 or in Q1 of 2024.



### **PLANIMETRIC DATA 2022**

### Things to consider

- Do we need to change any specifications?
- Should we put sidewalk widths in the public domain?
- What's the best way to acquire impervious surface?
  - Considering a pilot study in Boulder.



### PLANIMETRIC DATA 2022 – IMPERVIOUS SURFACE

#### **DRCOG Planimetric Data**



Missing features under 100 square meters

How much time and money does it take to get those small features?



Missing features over 100 square meters

Is this worth exploring?

**DRCOG Land Cover Data** 

Tree canopy interference

Is it possible to get this layer with tree canopy removed?



### LAND COVER 2020



### DELIVERABLES

- 3-foot resolution land cover for the 10-county region (same extent as custom imagery)
- 9-classes including:
  - 1. Structures
  - 2. Impervious surfaces
  - 3. Water
  - 4. Grassland/prairie
  - 5. Shrubland/scrubland
  - 6. Tree canopy
  - 7. Irrigated lands/turf
  - 8. Barren/rock
  - 9. Cropland



### **CHALLENGES**

• The project schedule was delayed by 2 months due to:

- Resource issues with Sanborn's contractor (UVM), including illness among staff, a burst water pipe in their office space, and slow connectivity during remote work.
- Miscommunication between Sanborn and UVM related to the quality assurance process.
- Complexity in the urban areas took longer to classify and manually edit than expected.



- Received a Colorado Water Conservation Board Water Plan Grant, which covered 50% of the cost.
- Leveraged a 2018 pilot project to demonstrate value of a regional extent ← good model for future datasets.
- Incorporated 2020 imagery, 2020 planimetric data, and 2020 lidar to create a high-quality and high-resolution product.

By the numbers		
Value of data	\$202,205	
Number of partners	11	
Square miles covered	6,000	
Classes	9	
Resolution	3-foot	



### **ACCESSING DATA**

 Raster available now on the Regional Data Catalog.

• Vector coming soon.

### PROGRAM

 Regional Land Cover
 Regional Lidar
 Regional Planimetrics
 Denver Regional Aerial Photography Project

#### 2020 LAND COVER RASTER DATA

Data Vintage: Apr 2022 Date Modified: Apr 2022 Original Sources: DRCOG Terms of Use



**GET DATA** 



### **THANK YOU TO OUR PARTNERS!**

- 1. City and County of Broomfield
- 2. City and County of Denver
- 3. City of Boulder
- 4. Town of Castle Rock
- 5. Town of Erie
- 6. City of Golden
- 7. City of Greenwood Village
- 8. City of Wheat Ridge
- 9. Mile High Flood District

10. Colorado Water Conservation Board11.Denver Regional Council of Governments

Expect a satisfaction survey soon!



### **PROGRAM UPDATE**

### **CURRENT INVESTMENT**



The 2020/2021 cycle was DRCOG's **most ambitious** to date.

Datasets from these four projects (imagery, lidar, planimetric data and land cover) are valued at \$2.9 million.

### **UPCOMING INVESTMENTS - PROPOSED**



### **MATERIALS FOR FURTHER DISTRIBUTION**

Overviews

- DRAPP
- Planimetric data
- Lidar
- Land cover
- Project summaries
  - <u>DRAPP 2020</u>
  - Planimetric Data 2020 coming soon
  - Lidar 2020 coming soon
  - Land cover 2020 coming soon

Available on drcog.org under Services and Resources

#### Services and Resources

- Boomer Bond
- Way to Go Commuter Services
- Data, Maps and Modeling
  - Community Profiles
  - Denver Regional Aerial Photography Project (DRAPP)
  - Regional Planimetric Data Project
  - Regional Land Use Land Cover Project
  - Regional Lidar Project
  - Denver Regional Data Consortium
  - > Denver Regional Visual Resources
  - Economics and Land Use
  - Travel Modeling



### **FEATURED USE CASES**

- DRCOG showcases how imagery, lidar, planimetric data, and land cover are used in our communities.
- Useful for demonstrating value during project fundraising.
- Consider contributing your own use case.

#### Emergency response

Community planning

Infrastructure improvements

Event planning

Pedestrian Infrastructure and Vulnerable Populations

Permitting for Marijuana Businesses Conservation Predicting Urban Air Temperature

Mapping Flood Hazards

Orienteering

Land Management

**Determine Water Quality** 



# Using land cover data to determine the effects of lawn fertilizers on downstream water quality

Article submitted by Steve Lundt, senior water quality scientist at Metro Water Recovery. Steve can be reached at 303-286-3272 or slundt@metrowaterrecovery.com.

This article originally appeared in the second quarter 2022 Denver Regional Data Consortium newsletter.

B arr Lake and Milton Reservoir Watershed Association is a nonprofit watershed group focused on reducing phosphorus loads to Barr Lake (Barr Lake State Park) and Milton Reservoir. Its goal is to reduce nutrient loads coming from the watershed of 2.5 million people in the Denver region. Both reservoirs are vital to the agricultural community for irrigation. Barr and Milton are also used for drinking water, recreation and fisheries. The association has identified as important a project related to source control through the use of phosphorus-free lawn fertilizers. DRCOG's 2018 land use land cover project has been vital in the efforts to estimate the amount of irrigated lawns in the urban area and how they might affect nutrient loading to the South Platte River and Barr and Milton reservoirs. Non-point sources of phosphorus from urban lawns can be enough to trigger large algal blooms during the summer.





### **BEST PRACTICES FOR USING IMAGERY IN ARCGIS ONLINE – JUSTIN WELLS, ESRI**



THANK YOU!
QUESTIONS?

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