MINUTES OF THE
ARIZONA GEOGRAPHIC INFORMATION COUNCIL
4D GEOSPATIAL DATA WORKGROUP

A Public meeting of the Arizona Geographic Information Council (AGIC) was convened on Tuesday, September 27 at 10am WebEx only due to COVID-19 health precautions. Present at the meeting were the following members or designees of the AGIC Public Safety Committee

Table1: Committee Voting Members (16)

Member	Agency/Company	In Attendance
Mark Christiano, Co-chair	US Forest Service	Yes, phone
Jenna Leveille, Co-chair	AZ State Land Department	Yes, phone
Kevin Blake	Yavapai County	Yes, phone
Mary Darling	Darling Geomatics	Yes, phone
Craig Erdman	Geo Engineers	No, without notice
Brian Fisher	CAP AZ Geodetic Coordinator	No, without notice
Benjamin Hickson	Anderson Optimization	Yes, phone
Keith Larson	USDA NRCS	Yes, phone
Arron Lee	Merrick & Company	Yes, phone
Jason Nyberg	NV5	Yes, phone
Chelsea Scott	Open Topography	Yes, phone
Travis Wooley	The Nature Conservancy	No, with notice

Table 2: Public at Large

Name	Agency/Company	In Attendance
Aryn Musgrave	Desert Botanical Garden	Yes
Barira Rashid	Student (ASU)	Yes
Brandon Barnett	AZ State Land Department	Yes
Brian Skerven	SRP	Yes
Chris Bertrand	San Xavier District	Yes
Chris Chalmers	WGI Geospatial	Yes
Cory Homuth	AZ State Land	Yes
Drew Decker	USGS	Yes
David Holm	Fugro	Yes
Faith Shelton	ADWS	Yes
Jackie Watkins	Cochise County	Yes
Jacob Thiel	Dewberry	Yes
Joe Cook	Arizona Geological Survey	Yes
Joe Wagner	Flood Control of Maricopa County	Yes
Joel Sankey	USGS	Yes

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Josh Pope	PAG	Yes
Karen Rogers	Dewberry	Yes
Kristin Straka	NPS	Yes
Larry Fox	Bad Elf	Yes
Mariah Modson	AZ State Land Department	Yes
Mark Nigrelli	USDA	Yes
Mark Topping	WGI Geospatial	Yes
Steve Wargaski	City of Mesa	Yes
Tom Homan	Gila County	Yes
Tom Mellin	USFS	Yes
Veronica Nixon	ADOT	Yes
Virgil Coxon	ADOT	Yes

The Committee discussed and acted on the following items.

I. Call to Order and Introductions

Meeting was called to order at 10:03 AM. Introductions were made, and quorum was established.

II. Approval of June Meeting Minutes

Approval was motioned by Ben Hickson and seconded by Jason Nyberg. No additional discussion on meeting minutes and they were passed unanimously.

III. AGIC UAS WG joining 4D Geospatial WG Discussion

With the LiDAR Work Group name being expanded to the 4D Geospatial Work Group, the UAS Work Group has recognized an overlap of project interests to the extent of proposing a combination of efforts. Recognition of these overlap of interests between the UAS and 4D Geospatial Work Groups has created the motion to merge the two. The combination of these groups will be represented as the 4D Geospatial Work Group ingesting the UAS Work Group.

There will still be a subgroup that meets fairly regularly, separate from the 4D Geospatial Work Group, that will discuss FAA regulations, the drone legalities, and the technological specification that come from that.

Since the data being gathered and discussed by the two groups are similar and have been slowly overlapping for some time now, this merge

is one that would create an efficient outlet for this data and the discussion of that data.

Topic for the merge of the two large groups was opened for discussion, which started with an inquiry about if there were overlap between the workgroup plan specifically. Jenna iterated that as far as the data goes, there is overlap between the coordination of data as well as educating on how to use the different geospatial outputs. Larry Fox from the UAS Work Group had added that he agrees with the notion that the data being collecting has a clear amount of overlap between the two groups and the knowledge around processing that data will be where these groups can converge. Larry also brought to attention that both of the groups have unique needs where there is not any overlap, which he stated is acceptable. The collaboration of these groups is really where Larry expressed this merge will shine. An example of explanation is when events and training seminars are held that the appropriate scope of all technologies are represented. Closing on this comment, the overlap of interest and collaboration between the events that are held allows for a complete representation with attendance and collective enhancement of participation.

Mariah expressed that the last UAS meeting covered the want to be able to meet as a subgroup to still be able to honor the differences in interests, which supports the idea of a UAS subgroup that still discusses the regulations and program-specific topics. Jenna did confer with the subgroup intentions and reiterated that the data dissemination between the two groups still filter to the same purposes, supporting the merge at bulk and keeping the specificities of UAS to a subgroup. That subgroup will maintain a bi-monthly schedule to keep current with the regulations and other UAS-specific topics.

Mark ended the discussion on the merger with the comment of this combination of efforts shining through during the Spring Symposium organization and presentation as well as the momentum it has garnered.

IV. 3DEP Update

Drew Decker of the USGS gave a presentation regarding the status of the 3D Elevation Program, or 3DEP. The presentation was of updated captured LiDAR data, where some part below and above the rim of the Grand Canyon were completed. Numerous areas in the southeastern area of Arizona are completed, as well as the central Coconino Strip Project. Pima County has a large block of data that is almost done with

processing and review, as well as Yavapai County. Planned work includes several FEMA projects that are awaiting the awarding of funding, which will be later this year. Areas of interest with LiDAR include an area in the Goldwater Range, as well as various areas in western Arizona.

V. BAA Discussion

A future BAA is working for FY2023. A Broad Agency Analysis, or BAA, is the vehicle used for working with the 3D Program on cooperative projects. This allows for an organization that is federal, state, local, private, non-profit, etc. to submit a proposal to do work anywhere in the US where LiDAR may be needed. 3DEP and the other federal agencies involved can then review the applications and make a determination of who will be selected for that acquisition, how a project will be scoped out, and how it can be supported. This will be released in October, which means the review of applications will happen usually within 5-6 weeks of BAA release. This allows for the projects that have been proposed for early 2023, or even the winter months of 2022, to be reviewed and possibly approved for work.

Information on the FY23 USGS BAA can be referenced here:

https://www.usgs.gov/3d-elevation-program/fy23-usgs-broad-agency-announcement-baa

This site houses a presentation recording that was held in August, as well as an FAQ page.

Jenna spoke on the information discussed within the NSGIC conference, where 3DEP was mentioned. Next steps for 3DEP include finishing coverage for all of the US. There is hope for funding to complete tribal areas in Arizona. BLM has funding and interest in southwest Arizona. Anyone that has interest in project coordination should reach out to either Jenna Leveille or Drew Decker. Any interest level is encouraged to reach out so that a level of needs can be assessed.

Jenna shared with us a part of the presentation she gave at NSGIC on how to finish 3DEP for the nation, where Arizona was used as an

example. Arizona's coordination with 3DEP has allowed for a 42% change in coverage in just four (4) years (23% in 2018 to 65% in 2022). 2018 marked the beginning of this workgroup and the start of a lot of coordination between different agencies, which shows the immense amount of progress that has been made through collaboration. This result is attributed directly to this group. The remainder of the collection is primarily federal or tribal land, with those lands making up about 76% of the land yet to be acquired.

A. Open discussion – AZ BAA applications/updates

   There was a question regarding the Yavapai project that is still under review, on if the boundaries would be available, to which Drew was able to direct them to the inventory that has the US. Jenna also stated that he has the boundary for those that wanted to reach out to her. A second question was if the status polygons were accessible, to which Jenna answered that AZGeo has updated services of these layers.

B. USGS Planning tools:
   1. Seasketch planning tool:

      https://www.seasketch.org/#projecthomepage/5272840f6ec5f42d210016e4

      This site allows for users to pinpoint different areas of interest, as well as some contact information that can be instrumental in forming potential partnerships. Federal agencies have a different method of submitting potential areas of interest, with which Drew Deck of the USGS would point to that contact if someone were to request. 3D Nation is working a large, comprehensive study on the future of elevation, which had a good number of responses from Arizona. Jenna stated that the status of 3D, although pretty far down the road, looks promising from a presentation at NSGIC. There was conversation of regional comprehensive updates, but the details and benefits are still working.

   2. Timeline US Interagency Elevation Inventory:

      https://coast.noaa.gov/inventory/

   3. Data download for existing lidar data:

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https://apps.nationalmap.gov/downloader/

VI. AGIC Education & Training Symposium 2022 Recap

Mark expressed how successful the AGIC Education and Training Symposium this year was. The in-person element allowed for effective networking and conversation between all of the GIS-involved areas. There were a lot of comments about how informative and engaging the 4D Geospatial tracts and special interest group lectures were. There was a comment about how a natural resources presentation mentioned how LiDAR data is essential in their research for the natural resource specific projects within the state, which expresses how imperative this group's efforts are within the state. Mark had also mentioned that the OpenTopo group's hands-on training session was very interesting and helpful. Within the OpenTopo hand-on session was a number of attendees that had no previous LiDAR experience and was able to work with and learn the different technologies that go into utilizing and processing that data.

This topic was opened for discussion and there was a comment on how it was a great experience to see and interact with everyone from AGIC and as well as attend lectures live. Jenna added to this saying that having everyone in one area was very productive and a good experience. She also concurred with Mark and reiterated that there were several LiDAR focused lectures, as well as general sessions, at the symposium and the need for statewide LiDAR is apparent given other lecture subjects too. There is an ongoing discussion on how exactly we will achieve that.

VII. USGS Lidar Applications in Arizona: Grand Canyon and Beyond! Dr. Joel B. Sankey – Research Geologist Southwest Biological Science Center – Grand Canyon Monitoring and Research Center

The USGS Grand Canyon Monitoring and Research Center (GCMRC) is the science provider to the Glen Canyon Dam Adaptive Management Program (GCDAMP) and can be viewed through the USGS website here:

https://www.usgs.gov/centers/sbsc/about/gcmrc

The GCDAMP program was developed to provide an organization and process for cooperative integration of Glen Canyon Dam operations,

downstream Colorado River resource protection and management, and monitoring and research information. It also serves to improve the values for which the Glen Canyon National Recreation Area and Grand Canyon National Park were established. The stakeholders within this program include different federal agencies, states, water users of the Colorado River in the Western US, Native American tribes, among other interest groups that are administered by the Bureau of Reclamation.

This presentation specifically went over the portion of the Colorado River that spans from Lake Powell to the Lake Mead reservoir. This area includes a portion of the Glen Canyon National Recreation Area, Marble Canyon, and the entirety of the Grand Canyon. Joel's work specifically is to conduct river corridor remote sensing assessments of the downstream effects of the Glen Canyon Dam.

Starting with the entirety of airborne remote sensing currently available, Joel went through the history of aerial remote sensing of this area from 1935 to present day. The earliest photos acquired from the air is from 1935, with the first set of photos that include the Glen Canyon Dam being from 1965. By the 1980's, the USGS acquired the first color and color-infrared air photos, with digital multispectral images following in the late 1990's. In 2000, the first and only airborne LiDAR of the entire area was acquired. After this, high spectral spatial resolution digital multispectral imagery and photogrammetrically derived digital topography was acquired in 2002, 2004, 2005, 2009, 2013, and 2021.

This can be references on the USGS website at:

https://www.usgs.gov/centers/southwest-biological-science-center/science/airborne-remote-sensing-grand-canyon?qt-science_center_objects=0#qt-science_center_objects

Some of the changes that Dr. Sankey was able to show during his presentation were that of sandbar size and vegetation growth due to releases and closures of the Glen Canyon Dam. In 1984, imagery was captured that showed vegetation being pulled out of the previous sandbar, and a new one being created, which was a result of an emergency release of water. In the aerial imagery since, from 1992 to 2009, the imagery shows that same sandbar having vegetation growing across it. Another example, which displayed imagery from 2009 and 2013, shows the impact a flash flood can have. In 2013, all of the vegetation that was shown in a Grand Canyon confluence with the

Colorado River. In a later photo from 2021, the vegetation can be seen starting to grow back.

Those examples bring weight to all of the monitoring of environmental changes that aerial imagery provides. From there, the importance of LiDAR is brought to attention by referencing how invaluable the single 2000 set that was acquired. An example that was given was how the water-surface profile at a constant river discharge is used to delineate the river shoreline and is used to calibrate models for predicting the water surface at other discharges. Models that predict the water surface as a function of river discharge are critical to attributing river and riparian landscape changes to operations of Glen Canyon Dam.

High resolution LiDAR data (about 100 points per square meter) were acquired in the Glen Canyon National Recreation Area between Glen Canyon Dam and Lees Ferry in 2013. Fusion of this LiDAR data with aerial imager were used to map stands of invasive tamarisk plants, measure their canopy structure and biomass, and detect the defoliation of the tamarisk cause by the introduced tamarisk beetle biocontrol agent. This is useful for land managers, for instance, like the park service, because they are required to make decisions as the beetles start to prey on these trees. These decisions can be if they are to leave the dead biomass out there, to consume it with a controlled fire, or event to cut it all down.

The second instance in which high resolution LiDAR has been useful for is monitoring the erosion of archaeological sites. Over time, the river will erode the river terraces and can threaten the archaeological sites, which are buried within those river deposits. Heavy rainfall can also cause flash floods, which would need to be researched as well to work at preserving these sites. Monitoring with topographic surveys and topographic change detection are conducted for these processes to identify erosion threats to the archaeological sites in that area.

Since there are not extensive high-resolution airborne LiDAR datasets for all of the Colorado River, Dr. Sankey presented on the extensive ground-based LiDAR, Terrestrial Laser Scanning (TLS). This was run as an operation for monitoring and research of archaeological sites along the Colorado River throughout Grand Canyon National Park. This was used to observe changes in the sediment in the archaeological sites that were mentioned previously.

The Colorado River in Glen and Grand Canyon has a large quantity of remote sensing data to describe the downstream effects of Glen Canyon Dam. The science conducted from that data is used by resource managers to quantify biology, geology, and cultural changes as a function of river hydrology and other drivers. Those resource managers can also use the conducted science to forecast future changes as a function of projected hydrology and other conditions. Baselining map-based monitoring data to evaluate future status and trends is an activity that resource managers within this area also perform. Remote sensing imagery, photogrammetry, and LiDAR are indispensable tools, which supports the notion that there should be more airborne LiDAR coverage of this project area.

The floor was open for comments or questions regarding the presentation. A question was raised about the level at which the altitude they were collecting for the photogrammetry they conducted their research on. Joel stated that the company used for the capture flew at or just above the rim of the canyon, resulting in data that was thousands of meters above the ground surface. The helicopter data that was captured was performed much farther below, but still closer to the rim of the canyon. Another question was if the quality of the comparisons changed with the more updated data to the older data. Joel said that with the higher level of data creates a tricky process when trying to conduct a comparison between newer and older datasets. Some of the power of the newer resolution datasets are sometimes limited because of this observation.

Anyone who is interested in Dr. Joel Sankey's background, or would like to contact him, visit here:

https://www.usgs.gov/staff-profiles/joel-b-sankey

VIII. Call for team volunteers

These volunteers would help with different documents, events, and the AGIC hub page. No volunteers were made apparent during the meeting, but those interested in volunteering are welcome to email either Jenna or Mark.

IX. Discussion and call for future presentations

During the call for future presentations there was no discussion. Those interested can email either Jenna or Mark with their inquiries.

X. Information or Topics for Future Meetings

No future topics were presented.

XI. Adjourn

Meeting adjourned at 11:30 AM

Upcoming 2021 Meeting Dates (Quarterly):

- February 22
- June 28
- September 27
- November 22