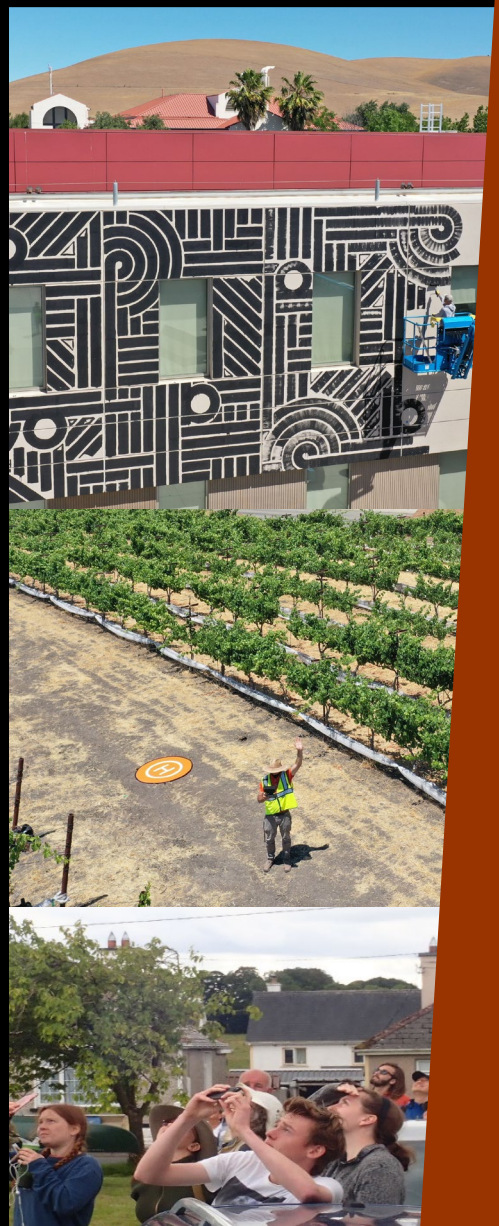
Presentation to the Academic Senate

New Course & Certificate

Non-Credit Aviation (NAVI)

Dan Cearley (Anthropology) September 8, 2021

Collaborators
David Everett (Viticulture & Wine Technology
Deanna Horvath (Photography)
Mike McQuiston (Administration of Justice)

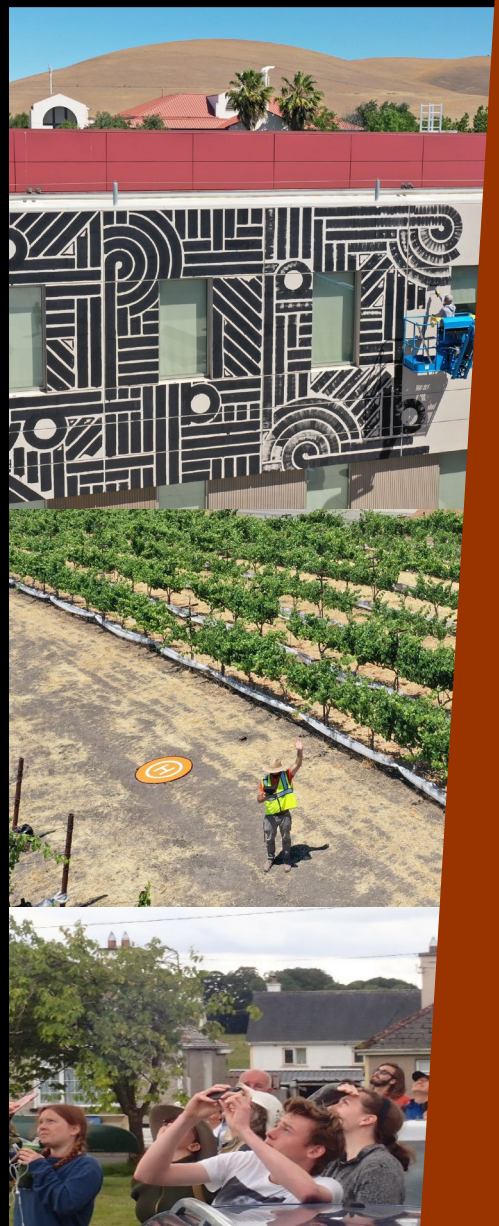


Non-Credit Aviation (NAVI)

LAS POSITAS COLLEGE

Elements

1. On-Campus Support
2. Costs and Resources
3. Need and Demand (CTE)
4. Regional Programs
5. Education Master Plan (EMP)
6. Curriculum – Sequence
7. Interdisciplinary
8. FTEF
9. Implementation Schedule
10. Outcomes (SLO)



Non-Credit Aviation (NAVI)

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1. On-Campus Support

Initial Interest

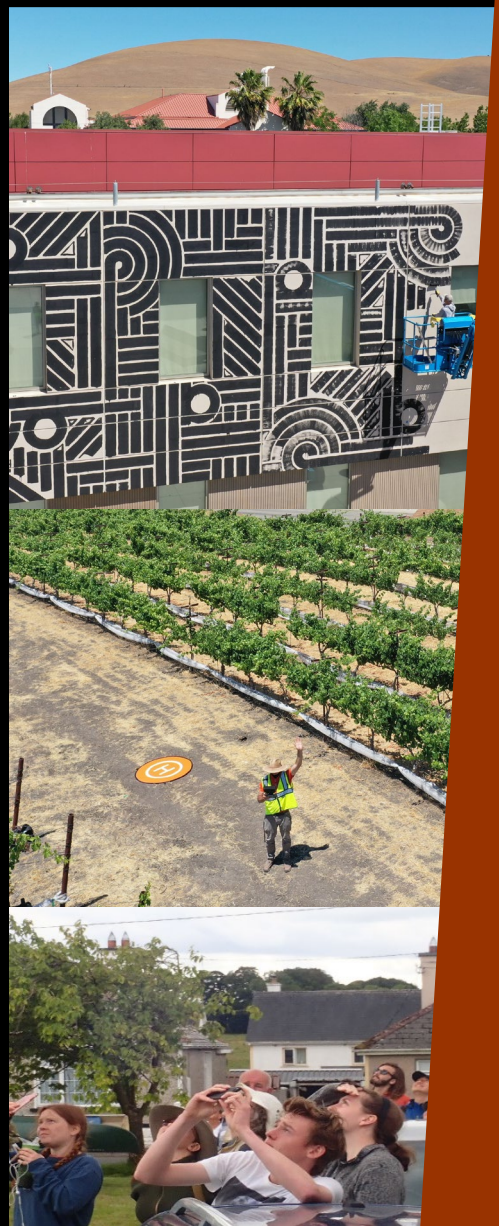
- Multi-Programs (ANTR, VWT, PHTO, AJ, and Fire Tech)

Start-up Funding

- Vicki Shipman & Workforce Development

On-going Meetings

- Public Safety & Administration
- Facilities & Sustainability
- Technology Services



Non-Credit Aviation (NAVI)

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2. Costs & Resources

Start-up Funding

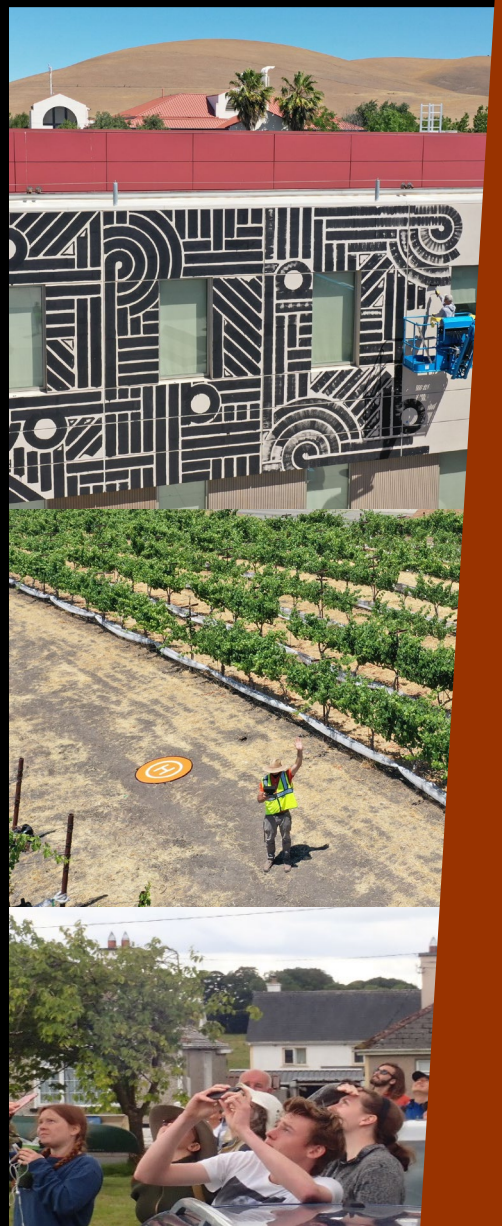
- Vicki Shipman & Workforce Development

Software

- Pix4D (Photogrammetry)
- Open Drone Mapper (Open Source)

Hardware

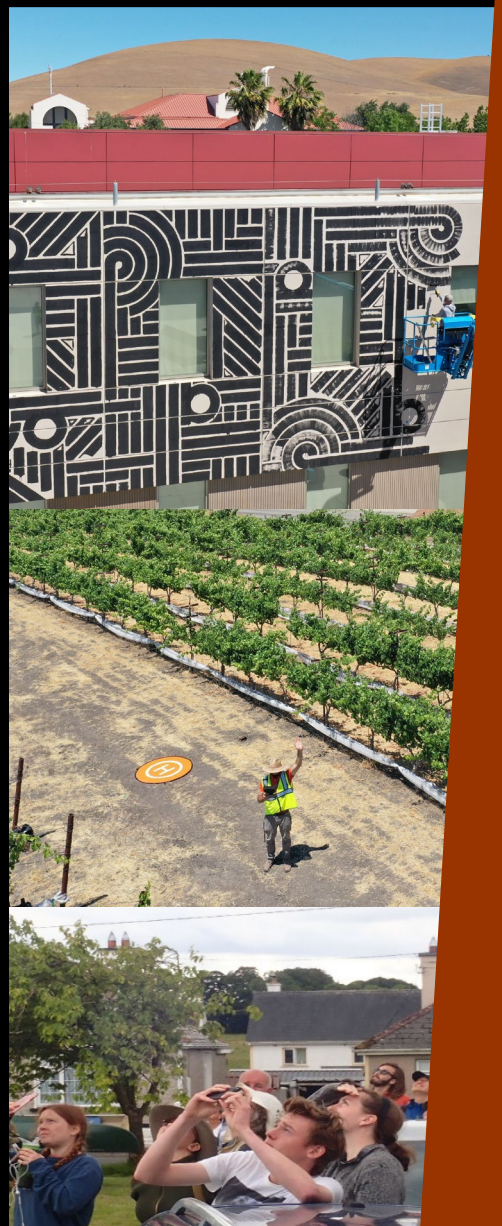
- Maintenance/Wear & Tear
  - 500 – 800 hours?
  - Batteries (500 cycles?)
  - Propellors ?
  - Hardware (controller, Vehicle) ?
  - 12 months (Current $200)



Non-Credit Aviation (NAVI)

3. Need and Demand (CTE)

- **Federal Aviation Administration (FAA) Stats**
- **Labor Statistics**
- **Other Programs**



Non-Credit Aviation (NAVI)

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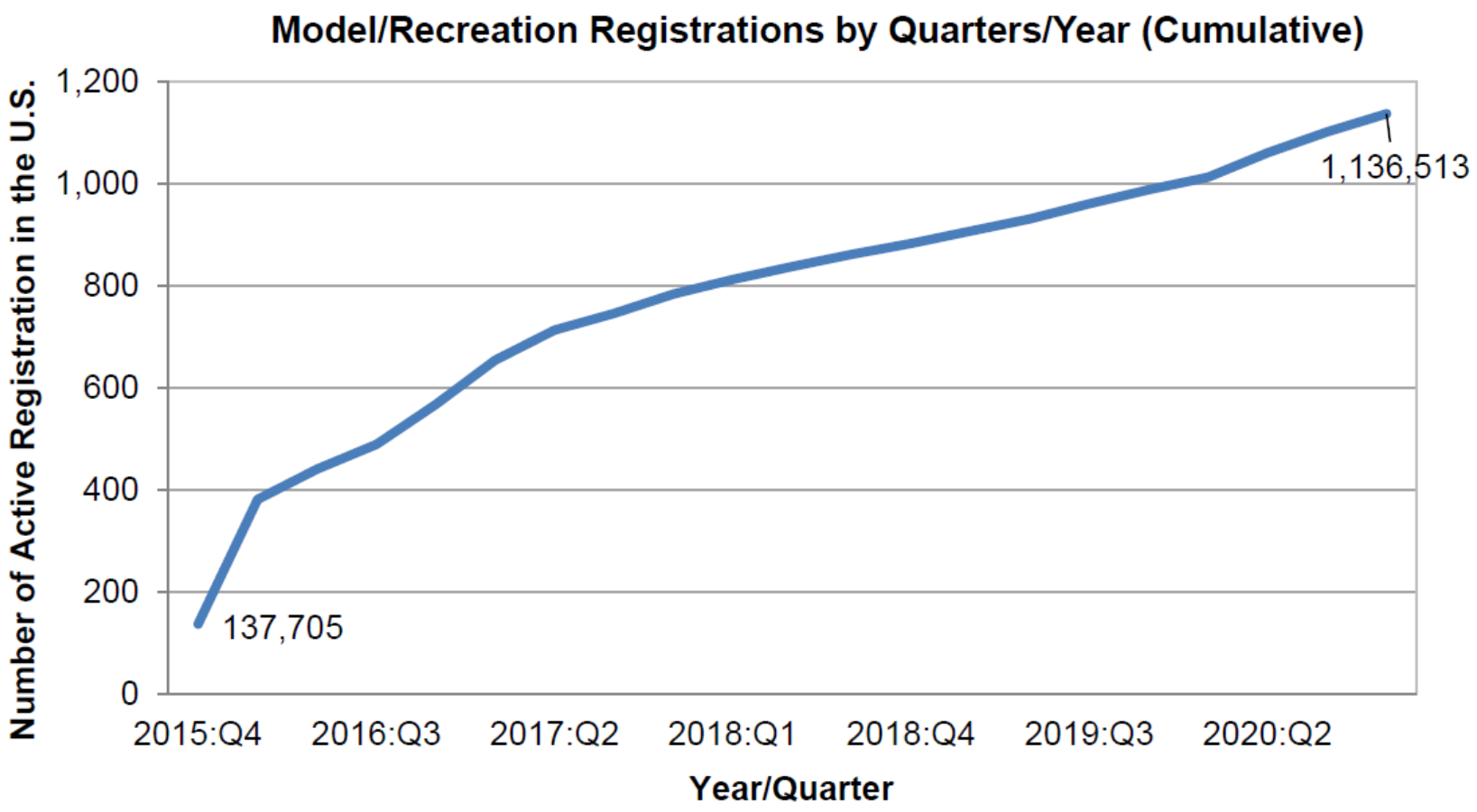
3. Need and Demand (CTE)

FAA Stats



Non-Credit Aviation (NAVI)

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3. Need and Demand (CTE)

FAA Stats

Aviation Administration (FAA), the use of UAVs is predicted to grow as shown in Figure 1.

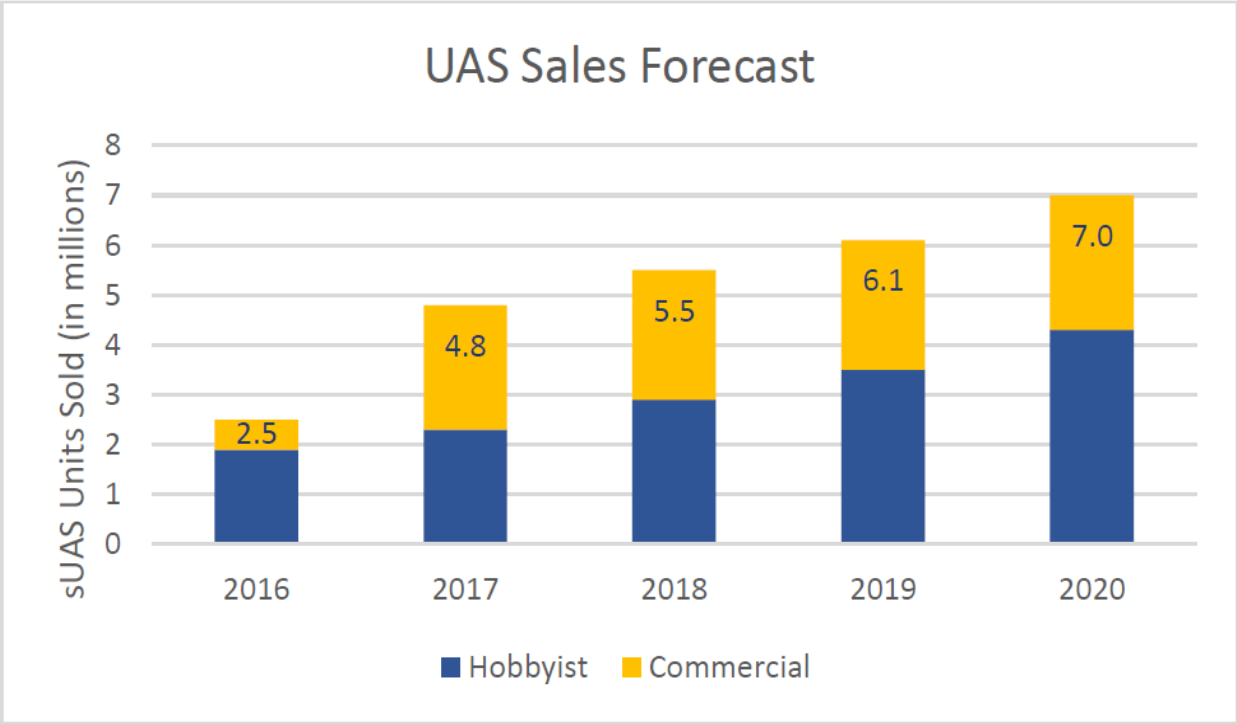

Figure 1 - Prediction of small Unmanned Aerial System (sUAS) units sold per year (in mil) [FAA, Fiscal report, 2016]

Non-Credit Aviation (NAVI)

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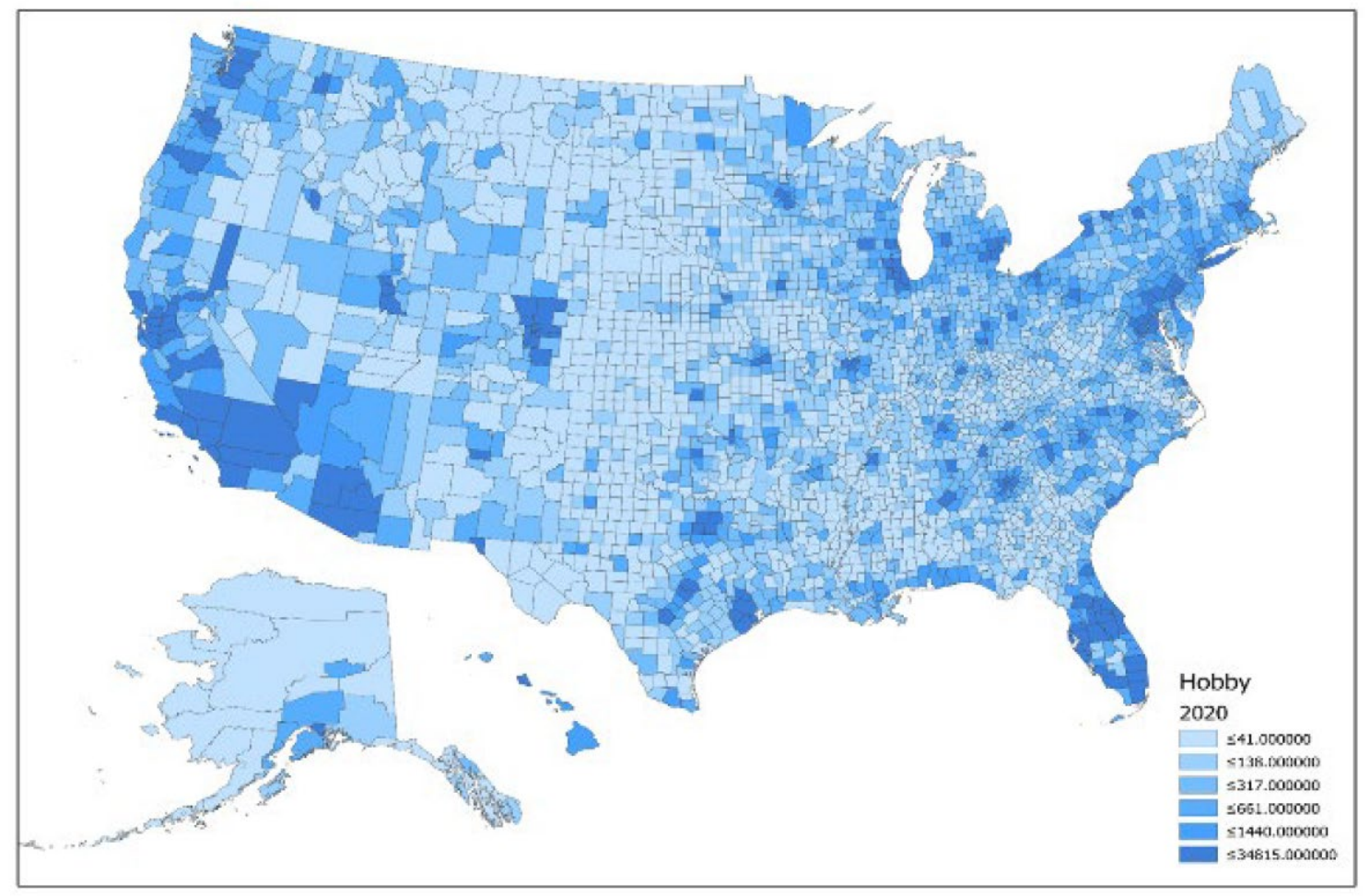
3. Need and Demand (CTE)

FAA Stats



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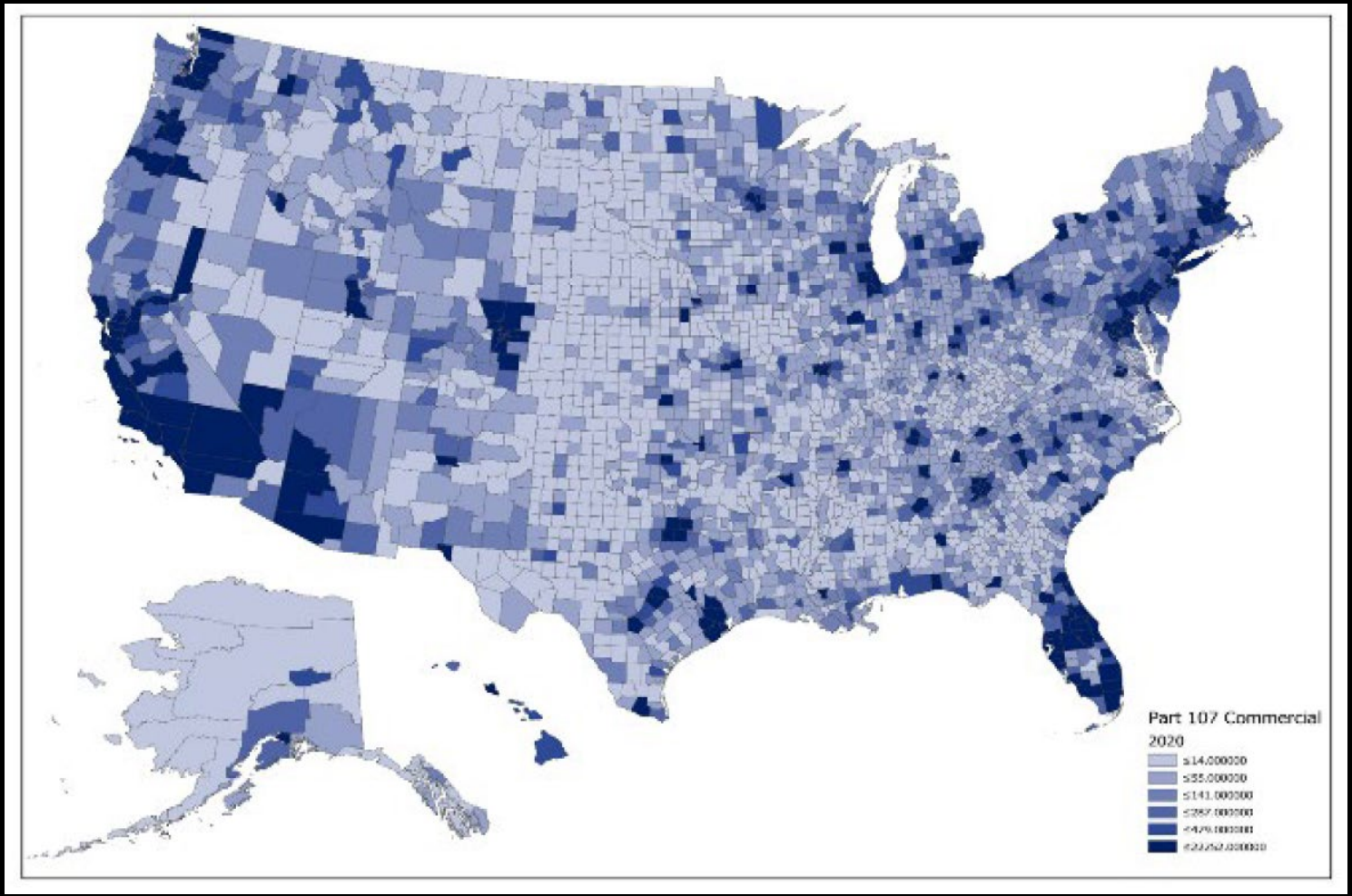
3. Need and Demand (CTE)

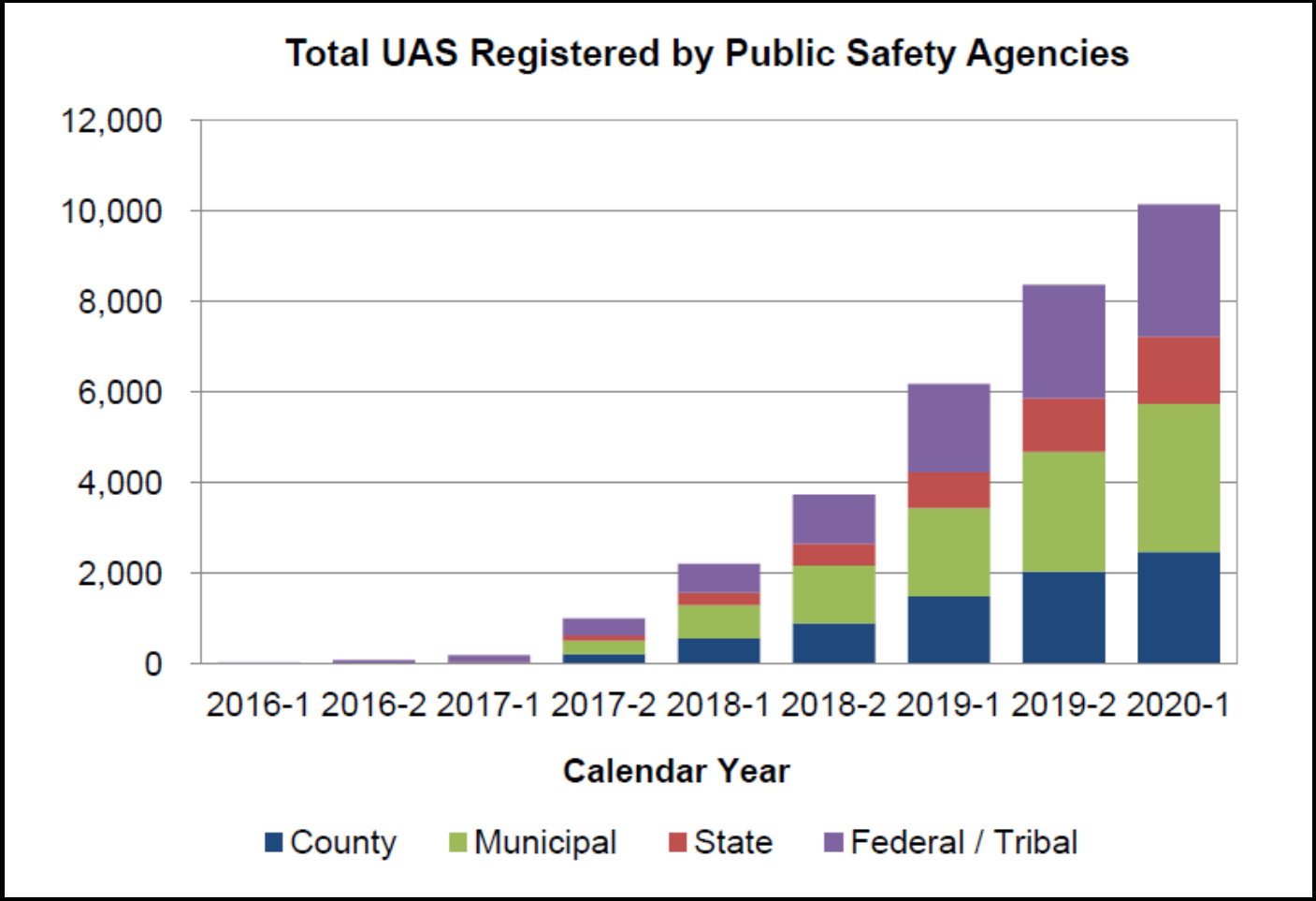
FAA Stats



Non-Credit Aviation (NAVI)

3. Need and Demand (CTE)

FAA Stats



Non-Credit Aviation (NAVI)

LAS POSITAS COLLEGE

3. Need and Demand (CTE)

Labor Stats

Drone Occupations Labor Market Information Report

Prepared by the San Francisco Bay Center of Excellence for Labor Market Research
January 2020

Recommendation

Based on all available data, there appears to be a significant undersupply of Drone workers compared to the demand for this cluster of occupations in the Bay region and in the East Bay sub-region (Alameda and Contra Costa Counties.) There is a projected annual gap of about 14,694 students in the Bay region and 1,552 students in the East Bay Sub-Region.

Non-Credit Aviation (NAVI)

LAS POSITAS COLLEGE

3. Need and Demand (CTE)

Labor Stats

Drone Occupations Labor Market Information Report

Prepared by the San Francisco Bay Center of Excellence for Labor Market Research January 2020

Table 2. Employment Outlook for Drone Occupations in East Bay Sub-Region

Occupation	2018 Jobs	2023 Jobs	5-Yr Change	5-Yr % Change	5-Yr Posts	Ave Posts	25% Wage	Median Wage
Software Developers, Applications	12,199	13,438	1,239	10%	5,248	1,050	$47.22	$59.45
Software Developers, Systems Software	5,712	5,895	183	3%	2,011	402	$46.69	$58.02
Electro-Mechanical Technicians	142	154	12	8%	75	15	$25.73	$31.71
Camera Operators, Television, Video, and Motion Picture	220	234	14	6%	121	24	$17.43	$26.28
Aircraft Mechanics and Service Technicians	944	964	20	2%	378	76	$33.44	$37.63
TOTAL	19,217	20,685	1,468	8%	7,833	1,567	$45.89	$57.37

Non-Credit Aviation (NAVI)

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3. Need and Demand (CTE)

Labor Stats

Drone Occupations Labor Market Information Report

Prepared by the San Francisco Bay Center of Excellence for Labor Market Research January 2020

Table 11. Education Requirements for Drone Occupations in Bay Region

Note: 46% of records have been excluded because they do not include a degree level. As a result, the chart below may not be representative of the full sample.

Education (minimum advertised)	Latest 12 Mos. Postings	Percent 12 Mos. Postings
High school or vocational training	1,125	2%
Associate Degree	490	1%
Bachelor's Degree or Higher	65,295	97%

Non-Credit Aviation (NAVI)

4. Regional Programs

City College of San Francisco	Photography
Evergreen Valley College	Surveying and Geomatics (SG)
Gavilan College	Aviation Maintenance Technology
Mission College	Computer and Information Sciences
Ohlone College	Multimedia
Santa Rosa Junior College	Computer Studies
Southwestern College	Aeronautics
West Valley College	Aviation
Diablo Valley College	Geography (GIS)

Non-Credit Aviation (NAVI)

4. Regional Programs

College	Department	Course Number	Course Title	Units	Lecture Hours	Lab Hours	Trans CSU/UC
City College of San Francisco	Photography	PHOT 102D	Beginning Drone Piloting and Imaging	2			
Gavilan College	Aviation Maintenance Technology	AMT 225	Introduction to Drones	3			
		AMT 226	Drone Flight Operations and Pilot Certification	3			
		AMT 227	Drone Aerial Photography and Videography	3			
		AMT 228	Drone Maintenance Technician	3			
		AMT 232	Drones in Business and Industry	3			
		AMT 229	Advanced Drone Aerial Photography and Cinematography	3			
		AMT 230	Data Acquisition, Mapping, and Surveys With Drones	3			
		AMT 233	Drones in Agriculture	3			
Mission College	Computer and Information Sciences	CIS 035	Introduction to Drones and Unmanned Aerial Vehicals	4			Pending
Ohlone College	Multimedia	MM 124	Commercial Drone Imaging		36	54	CSU (T)
Santa Rosa Junior College	Computer Studies	CS 76.11	Commercial Drone Imaging	3			CSU
Southwestern College	Aeronautics	AERO 107	Small Unmanned Aircraft System (sUAS) Remote Ground School	1	18		
	Aeronautics	AERO 107	Remote Pilot Ground School	2	19		
West Valley College	Aviation	AVIA 030A	Pilot Ground School	3			
		AVIA 030B	Introduction to Unmanned Aircraft Systems	3			
		AVIA 030C	UAS Image Analysis and Visualization	3			
		AVIA 030D	UAS Flight Operations and Planning	3			
Diablo Valley College	Geography	GEOG 164	Drone Operations and Piloting	3	36	54	CSU
		GEOG 165	Drone Remote Sensing and Mapping	3	36	54	CSU

Non-Credit Aviation (NAVI)

5. Education Master Plan (EMP)

NAVI Alignment

Goal A: Educational Excellence

A1. Analyze and **meet the educational needs of a diverse population** and global workforce through ongoing program support and innovation.

A4. Provide students with the **knowledge and skills necessary for career readiness and advancement**.

Goal E: Equity and Anti-Racism

By offering this as a non-credit course series we remove some of the financial barriers. The associated certificate allows for certain expanded funding opportunities.

Non-Credit Aviation (NAVI)

6. Curriculum – Sequence

Noncredit Aviation – Certificate of Completion

Career Development and the College Preparation (CDCP)

Noncredit Aviation - Certificate of Completion (Noncredit CDCP)

Fall 2022

Required Core: (66 Hours)		**Hours**
NAVI 201	Orientation to Drones and Unoccupied Aerial Systems (UAVs)	27
NAVI 202	Drone Aerial Survey, Photography and Videography	27
NAVI 203	FAA Remote Pilot Certificate Exam Preparation	27
Total Hours		**81**

PID 1030

5-week Hybrid course with Saturday Lab sessions

Non-Credit Aviation (NAVI)

7. Interdisciplinary

Current Programs Involved & Uses

Anthropology	(Archaeological Survey Methods)
Viticulture & Wine Technology	(Agricultural Survey)
Photography	(Mural Installation documentation)
Administration of Justice	(Search & Rescue demo -Planning)
Fire Technology	(Search & Rescue demo -Planning)

Ancillary Programs

Geography and GIS	(Remote Sensing & Cartography)
Business	(Marketing and Business Planning)

Administrative	Facilities & Marketing

Non-Credit Aviation (NAVI)

LAS POSITAS COLLEGE

CAMPUS HILL VINEYARD - A Hawks Eye View

LAS POSITAS COLLEGE

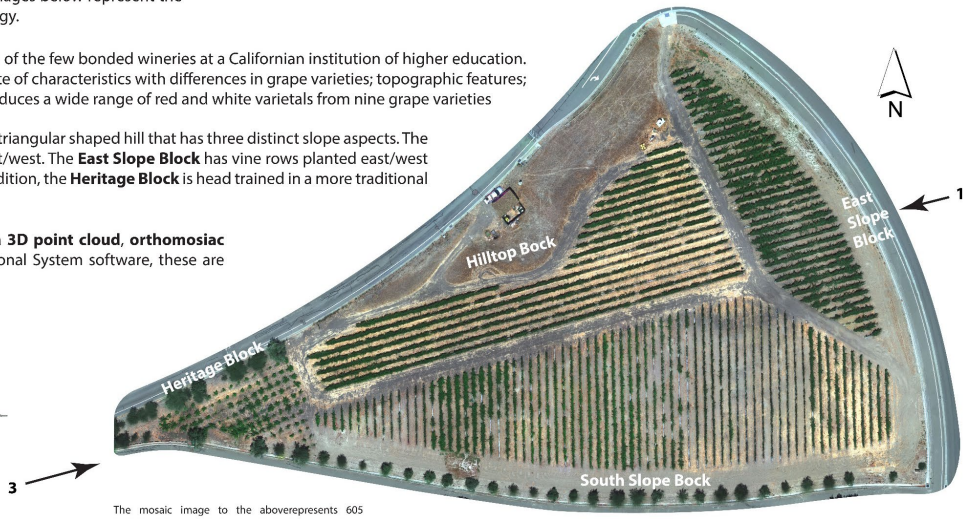
UAS Generated Topographic 2D & 3D Views

In 2021, the Viticulture and Wine Making program carried out an aerial survey of the Campus Hill Vineyard with a drone or more aptly called an Unoccupied Aerial Systems (UAS). The images below represent the various visual aids produced and shows the range of potential of this technology.

Las Positas College farms its own, 4-acre, hillside estate vineyard and is one of the few bonded wineries at a Californian institution of higher education. The Campus Hill Vineyard is a relatively compact location with a diverse suite of characteristics with differences in grape varieties; topographic features; row orientation; trellis technique; and irrigation methods. The vineyard produces a wide range of red and white varietals from nine grape varieties

Located at the entrance of Las Positas College, the vineyard is situated on a triangular shaped hill that has three distinct slope aspects. The vineyard is planted in four blocks: **Hilltop Block** has vine rows planted east/west. The **East Slope Block** has vine rows planted east/west and the **South Slope Block** (blue) has vine rows planted north/south. In addition, the **Heritage Block** is head trained in a more traditional approach to grape growing.

There are three main data sets created by the photogrammetry programs: a **3D point cloud**, **orthomosiac image**, and **digital surface/terrain models**. By using Geographic Informational System software, these are used to generate other spatial topographic and surface relief maps.



East Slope Block 1

South Slope Block 2

Hilltop, Heritage, and South Slope Bock 3

The 3D point clouds are powerful tools to visualize the vineyard from multiple perspectives. These three profiles below were created using the open-source 3D point cloud program called Cloud Compare.

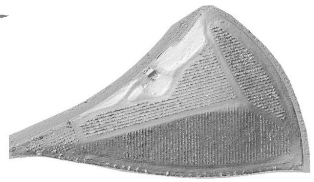
3D POINT CLOUD

The mosaic image to the aboverepresents 605 individual images that were stitched together by a photogrammetry process using spatial algorithms. In our work, two similar software programs were employed (Pix4D and Open Drone Mapper), the former is a paid service and the later is open source.

ORTHOMOSAIC IMAGE 2

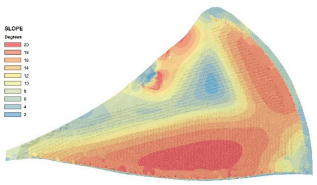
This is an orthomosaic, meaning it is geographically tagged and can be positioned in its approximate location with a high level of accuracy. The flight took less than 15 minutes and flown 30m (98ft.) above ground surface in a preprogramed route.

Digital Surface Model (DSM)



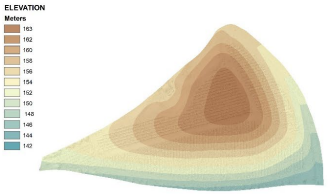
A DSM creates a unique view of the landscape a shadowing technique. It includes the tops of buildings, trees, powerlines, and other features. . From this model, the internal pathways within the vineyard are clearly defined as are some of the infrastructure components.

Slope Aspect



Slope aspect or steepness of the hill is measured in degrees. The East and South aspects have similar inclines from 16 to 20 degrees. In contrast the Hilltop has plateau like center with a gradual decline moving to the west and heritage rows.

Topographical Relief



This is a contour map showing the incremental rise in elevation from the edges of the hill to its apex at the center.

2D SURFACE MODELS

2021 - Prepared by the Las Postas College Anthropology Program (Contact Prof. Daniel Cearley ~ dcearley@laspositascollege.edu)

Non-Credit Aviation (NAVI)

SOUTH SLOPE BLOCK JUNE/JULY/AUGUST 2021 NORMALIZED DIFFERENCE VEGETATION INDEX (NDVI)

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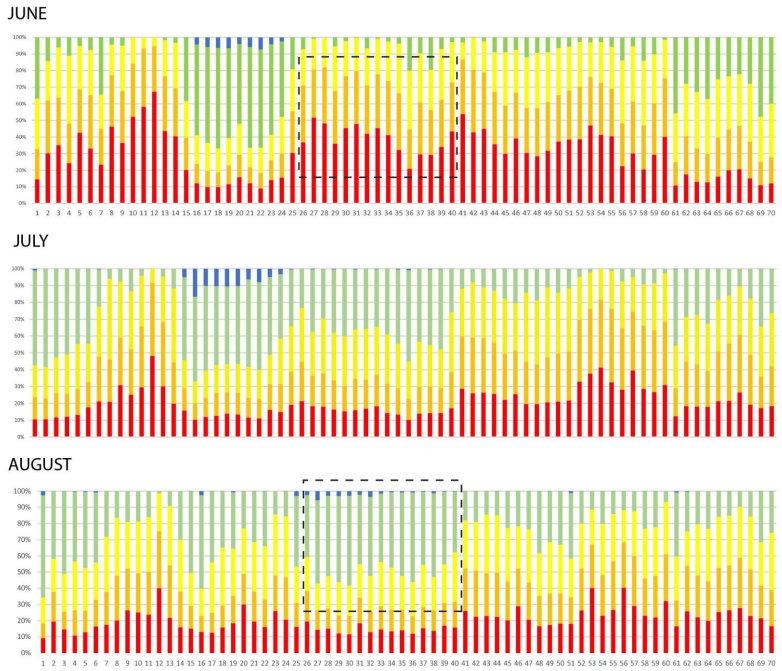
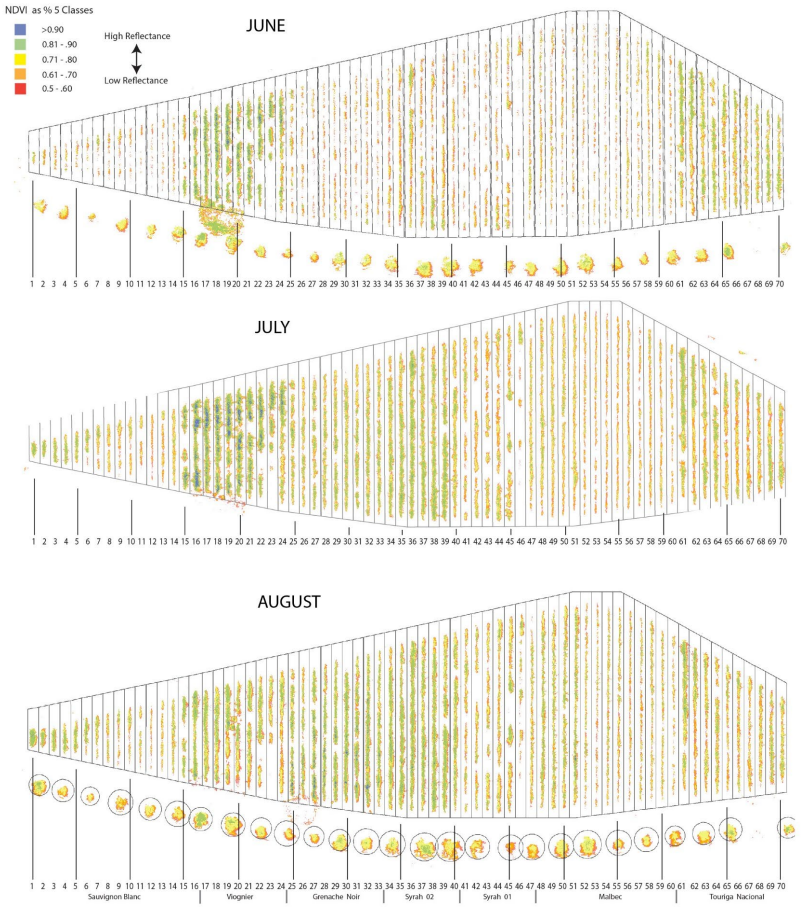




General Comments

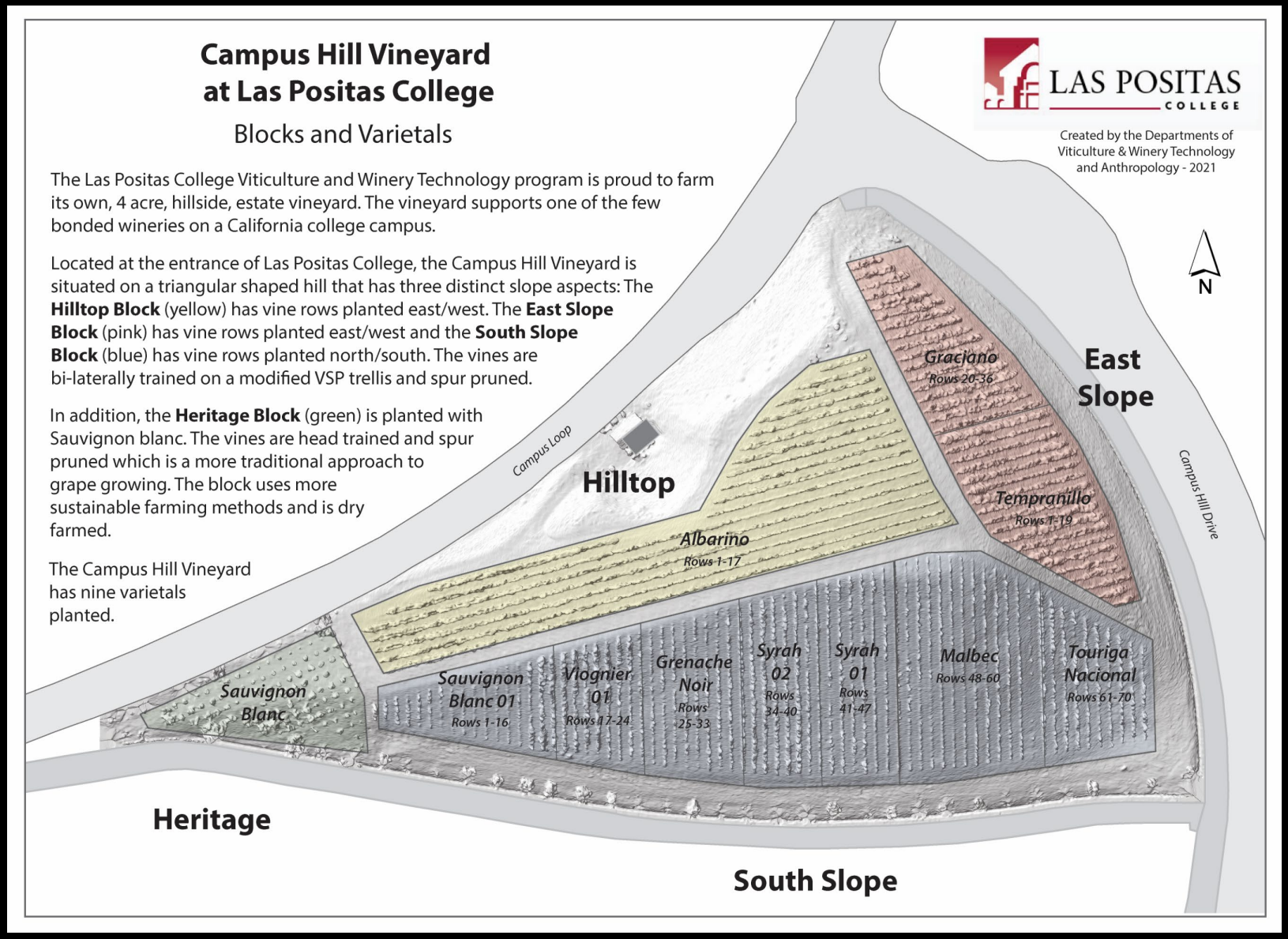
TThe South Slope Block row values are more varied in comparison to the main vineyard. This is not necessarily surprising since it is the largest of the four blocks, has the most diversity in varietals, and the greatest variation in slope aspect. Over the three-month period, the block seems to have overall increased mid-range values and decreased low-range values from June to Aug.

Areas of Interest

There are a group of rows which exhibit a signature unique in comparison to others. Over the three months, some groups seemed to develop strong upper lever values while others retained mid-level values, as highlighted by the dashed outline, where rows 26-40 responded differently to adjacent groups. A few rows 12, 53, and 60 may be candidates for field observation since these stand our among their groups.

Map and data prepared by the Anthropology Program of Las Positas College ~ Contact Prof. Cearley ~ dcearley@laspositascollege.edu

Non-Credit Aviation (NAVI)



Non-Credit Aviation (NAVI)

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8. FTEF

In order to pay for these courses, we shifted this from a credit to non-credit.

- Currently **SCFF funds** noncredit courses
- Unsure about the longevity of this arrangement?
- a CDCP certificate allows us to collect money from the State at the highest FTES funding rate

- Our hope is that we will use our current time under SCFF funds to **gauge the student interest** and potentially create a credit option for these types of courses in the future.

Non-Credit Aviation (NAVI)

9. Implementation Schedule

Launch Fall 2022 – Verify?

Some revisions remain based on on-going feedback

Non-Credit Aviation (NAVI)

10. Outcomes (SLO)

NAVI 201 ORIENTATION TO DRONES AND UNOCCUPIED AERIAL SYSTEMS (UAS)

A. Evaluate the **legal** (local, state, and federal) and **ethical** frameworks in order to **safely operate** common Unmanned Aerial Systems (UAS), more commonly referred to as drones.

B. **Safely operate a UAS** and perform a controlled take-off, demonstrate basic flight controls, and execute a landing.

C. **Describe the varied uses** of an Unoccupied Aerial System (UAS) in multiple disciplines and careers.

Non-Credit Aviation (NAVI)

10. Outcomes (SLO)

NAVI 202 DRONE AERIAL SURVEY, PHOTOGRAPHY AND VIDEOGRAPHY

A. Evaluate the **legal** (local, state, and federal) and **ethical** frameworks in order to **safely operate** common Unmanned Aerial Systems (UAS), more commonly referred to as drones.

B. Create and produce an **original professional presentation** to tell a story using aerial photography, Videography, and/or other remote sensing data set.

C. Describe the varied uses of an Unoccupied Aerial System (UAS) in multiple disciplines and careers.

Non-Credit Aviation (NAVI)

10. Outcomes (SLO)

NAVI 203 FAA REMOTE PILOT CERTIFICATE EXAM PREPARATION

A. Evaluate the **legal** (local, state, and federal) and **ethical** frameworks in order to **safely operate** common Unmanned Aerial Systems (UAS), more commonly referred to as drones.

B. Explain the conditions involved in **safely operating a drone**, including flight dynamics, airspace restrictions, and weather environments.

C. Demonstrate knowledge of the FAA regulations for piloting drones by **completing the written practice Remote Pilot Certification test** with a score of 70% or higher.

Non-Credit Aviation (NAVI)