Joel Flanders (Agricultural Systems Management)
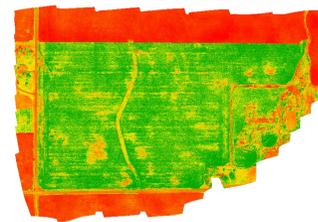
Objective:
. To conduct research in the fields of drone applications and scouting efficiency.
. To carve out details and plan logistics for an upscaled drone operation.

Purposes:
. Crop Health Imagery (NDVI) Natural Differential Vegetative Index which is used for detecting problems in the field.
. Marketing and Promotional Products such as video and aerial imagery come in handy when trying to promote a company or a brand name.
. UAVs, or an Unmanned Aerial Vehicle can be used just purely for observation purposes and to get a birds eye view of a field.

End Goal:
. That UAVs will be useful as a tool to our local growers and that they fully understand the effectiveness of an Agricultural Drone.

Outline:
. Goal Flight Acres: 30,000
. # of Flights: 4
. Time period in which this is done: 10 weeks
. # of Drones needed: 5
. Acres one drone can reasonably cover in one day: 1000 acres
. Cost for Service: $1.50/acre
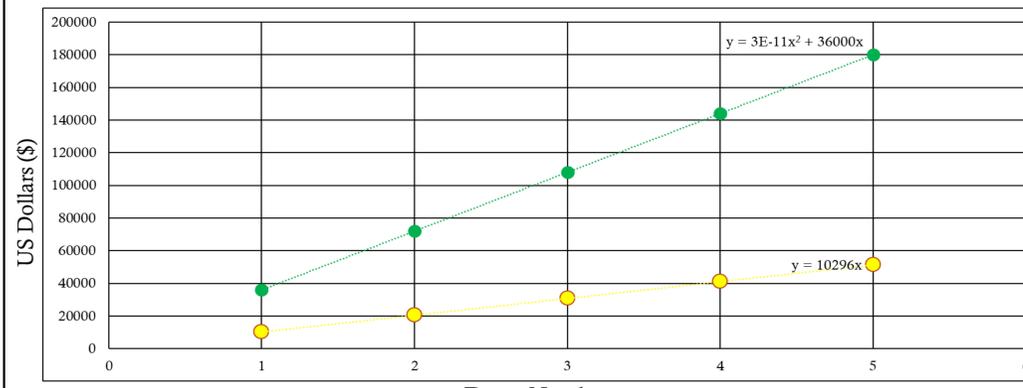. Benefits: Improves Scouting efficiency, Improves Yield Check, Improves farmers man-

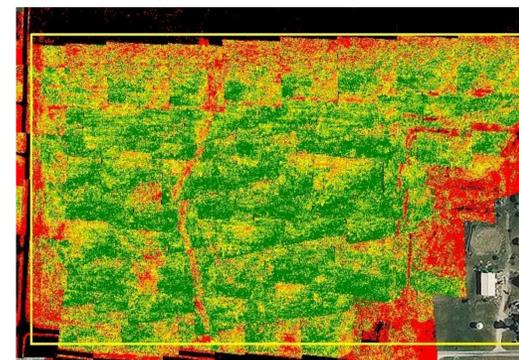**DroneDeploy**

How can Drones Improve Co-Alliance?
. Co-Alliance has a scouting program that consists of about 40 students that work each summer walking fields and recording problems observed during their visits. The farmer then has records of these visits through Co-Alliance's app called DOT, or Data On Touch. This helps keep the farmer knowledgeable on his field conditions. Technology such as a drone flying over a field of corn now improves the company's scouting efficiency. Now the scout has a road map of where and how big each problem area appears to be. With the help of an iPad, an NDVI image is a tool no-one can turn down. Now, five hundred acres can take 2.5 hours instead of 5-6 hours.

How can Drones Improve Farming?
. Just like any other career choice, technology helps improve any field of study. Farming will be improved by UAVs when the farmer starts using this data for his decision making process. Making a data-driven decision includes analysis of what the problems are and how big of an impact they are making. Percentage of the field

Breakdown of Input Costs and Break-Even Point

Drone	Cost/units ($)	Units	Total Cost ($)	Battery Life	Altitude	Acres/Battery	Acres/Day	Acres Covered/drone	# of Flights	Total Acres/Drone/Year
Phantom 4pro	2300	5	11500	30 mins	400 ft	130	1040	6000	4	24000
Pilot	4800	5	24000	40 hrs/wk						
iPad and Computer	2000	5	10000							
Drone Deploy	299	5	5980							

. As you can see, even after the high input cost of buying 5 more Phantom 4pro UAVs, we are still calculating more than 100% ROI (Return on Investment) This estimate was made using our first year goal of 30000 acre goal. So in other words, the farmer will pay for his acres to be flown by the acre. Regardless if it's the same field. He still pays for the field to be flown again.

. The number of flights needed would be 4 at a rate of $1.50 per acre.

. Gross Return: $180,000 Total Costs: $51,480 Net Return: $128,520

. This graph shows how even one drone added to Co-Alliance makes a 71%

$$y = 3E\text{-}11x^2 + 36000x$$

$$y = 10296x$$

Legend: Yellow line- Cost per Drone Green line- Revenue per Drone

ROI.

Shown above:

NDVI of wheat two

Left Image: AgVault Quicktile Software

Right Image: Agisoft Stitching Software

Which quality would you prefer if we were to fly your

PURDUE AGRICULTURE
PURDUE UNIVERSITY

PURDUE ENGINEERING
Think impact.