

**Efficiency of vehicle usage: A look into the  
adoption of telematics on fleet vehicles for  
maximum optimization**

by

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## ABSTRACT

Since its inception in the late 19<sup>th</sup>, early 20<sup>th</sup> century, the automobile has had a deep impact on the agricultural industry from a global standpoint. Farming organizations around the world depend on automobiles, such as pick-up trucks to transport employees, goods, services, tools, etc., to complete jobs and tasks in order to continue to feed the human race. Florida Crystals Corporation (acknowledged further as FCC) is a family-owned, fully integrated, sugar cane company with approximately 500 employees in company vehicles throughout a given fiscal year. FCC operates with a fleet primarily made up of Ford vehicles. These vehicles are important to day-to-day operations. Understanding how they are being operated and maintained is crucial to ensure safety for FCC's drivers, to reduce downtime, and be able to get the best return on investment (ROI) when it comes to replacing the vehicle. At this moment, there is useful information through Ford Pro Telematics on Ford vehicles for tracking and maintenance purposes.

The purpose of this thesis, is to understand how Ford Pro Telematics data can help FCC examine and assess how efficiently their fleet is currently operating and the ways FCC can improve and enhance driver's habits to effectively optimize the fleet. From the fleet of 500 vehicles, this study focused primarily on the F-150 model. Out of 200 F-150s, a sample of 10 F-150s and their drivers were taken into consideration. Selection was reviewed and approved by the FCC human resources department and all participating drivers were notified they were selected for the demo.

Data collection was used from Ford Telematics as well as FCC's internal management system, SAP, to create statistical methods to analyze vehicle and driver

efficiency and performance. The indications and areas of consideration for FCC were vehicles being operated at excessive speed, hard acceleration, hard braking, oil changes past due, excessive idling, and drivers not wearing their seatbelt when the vehicle was in motion above 5mph. Although this data may provide value in narrowing down problematic drivers to reprimand them and reduce expenses, Ford Pro Telematics also shows positive driver and vehicle performance. Indications and areas of consideration for FCC were vehicles being operated at the posted speed, normal acceleration, normal braking, oil changes and preventative maintenance taken care of in a timely manner, low idle times, and drivers wearing their seatbelt. This data may provide value in a reward system for good behavior. Above all, the goal for FCC is to improve vehicle and driver performance to yield a safer environment for employees and ensure they are optimizing their vehicles' performances.

Telemetry technology comes with additional expenses to each vehicle as a subscription is needed in order to access the data each vehicle is providing. Justifying the added expenses with a return on investment is the purpose. Utilizing telematics the correct way, whether it is addressing the negative or positive driver habits, will add to productivity of FCC's operation and reduce downtime when a vehicle is operated incorrectly. When drivers are addressed for their performance, it will improve overall efficiency and optimization of how the vehicles are being used. Incentive and motivation plans can be put into place after data is collected. As data is collected year-to-year, it can be used to further evaluate costs and benefits.

The data provided from Ford Pro Telematics showed that preventative maintenance was an important factor in prolonging the life of a vehicle, and may have helped prevent the loss of a vehicle by informing management that the vehicle was past due an oil change. It also showed that if gallons consumed through idling were reduced, it would offset the cost of the subscription on a month-to-month basis, or an entire harvest season for the sample of 10 trucks. The other data, such as driver location, drivers' daily routes, and driver safety, are added benefits that do not necessarily have a direct economic impact that is easily calculated through the demo. However, it could provide management with details to ensure that employees are completing their daily tasks in the most efficient way possible, i.e. taking the shortest routes possible to save fuel and additional wear and tear on vehicles.

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## CHAPTER I: INTRODUCTION

### 1.1 Motivation

Florida Crystals Corporation (FCC), which commenced as a small family farming operation in Pahokee, Florida in 1960, has grown to be one of the world's largest fully integrated sugar cane operations in North America. Beginning with a 4,000 acre plot of land, the family purchased three obsolete sugar mills in Southern Louisiana. They shipped the mills to South Florida, where they constructed their first operating mill, which is still in operation today. Over the last sixty-one years, FCC has grown to over 180,000 acres through strategic acquisitions. Not only does FCC grow, harvest, refine, and distribute the final product of cane sugar, they are also involved in the production of other crops such as rice, sweet corn, and several other vegetable crops. With these expansions, FCC also broadened their processing operations with the purchase of another sugar mill, Okeelanta Corporation, and a rice mill – Semchi Rice, which are also located in South Florida. Their commitment to be good stewards of the land has allowed them to be the leader in organic sugar cane farming and milling in North America.

Like most large operations, it takes a substantial amount of personnel and equipment to keep FCC in full operation throughout the year. The FCC fleet consists of over 5,000 pieces of equipment. The equipment ranges from on-road vehicles, tractors, harvesters, irrigation pumps and power units, construction equipment, and implements to work and till the land. FCC uses an internal computer system, called SAP SE, to track the existing fleet for inventory and preventative maintenance purposes, but SAP SE is outdated and cumbersome. The software does not allow operations to monitor the day-to-day

activities of the fleet. The company has been using this system since 2001, and not much has changed with the way it is used to the present day.

Technology has advanced tremendously over the last two decades, especially when it comes to GPS and tracking systems. Although FCC has had an interest in precision agriculture technologies for their agricultural equipment, they have not placed a strong focus on the rest of the fleet, especially on-road vehicles. The use of precision ag technologies, such as tracking devices on their fleet, would help reduce unnecessary use, improve location services, keep up on preventative maintenance, hold accountability for operators and end users, and allow operations to make optimal decisions when it comes to the replacement cycle.

The majority of the FCC on-road vehicles are Ford F-150 trucks with approximately 200 F-150s operating throughout the year. Ten of the 200 trucks are eligible for Ford Telematics subscriptions, a vehicle tracking system, which would allow for monitoring of vehicle performance using an online platform. Ford Motor Company presented this offer to FCC for ten trucks. FCC then selected the group of ten trucks based on location, position, and model year (2020 and newer). The FCC human resource department approved and reviewed the selection process, as well as ensured that the drivers were aware they were going to be involved in the demo.

Ford Telematics is an advanced system that allows for remote monitoring of vehicles that subscribe to the Ford Telematics online portal (Ford 2021). When a vehicle is subscribed, it provides GPS fleet tracking, vehicle health alerts, driver behavior insights, fuel efficiency analysis, and the Ford Pro Telematics drive app. Ford Pro Telematics

provides value by allowing fleet managers to improve the management and overall performance of their vehicle fleet. The system provides a simple way to look at vehicle and driver performance, identifying problems and allowing management to instill corrective actions before downtime occurs. Although there are many fleet tracking companies and software available, Ford Pro Telematics presents an outstanding opportunity for FCC as it is capable of being fully integrated into Ford vehicles without the hassle of extra hardware and devices needing to be added to a specific vehicle in order to improve and optimize operations.

Adoption of Ford Pro Telematics could provide value innovation to FCC's current operation. Starting with the fleet overview and utilization, a manager is able to monitor an individual vehicle or the entire fleet from a dashboard point of view. Being able to track different operational aspects of the vehicle, including speeding, high idle periods, harsh braking or acceleration, and location, allow for better control of operational vehicle costs, helping to reduce these costs if corrective action is taken when needed. Another area that can provide value innovation is that Ford Pro Telematics allows managers access to vehicle health. Aspects like odometer readings, engine oil life and hours, diagnostic and fault code information, as well as potential recalls or product improvement programs can prevent potential failures and breakdowns before they happen. When breakdowns are prevented, downtime is significantly reduced.

Like most technologies, Ford Pro Telematics will continue to advance and evolve. The current system allows for more than 3,800 fault codes to warn drivers and managers to take action immediately or as soon as possible to avoid vehicle failures. That being said,

Ford is also introducing remote update capabilities in their 2021 models, which will allow for software updates to be completed without having to visit a dealership. Finally, when the vehicle has reached a point where it is ready to be replaced, FCC can provide the overall history of the vehicle to either the dealership that it is traded in to, or the customer purchasing it at FCC's annual auction. This will provide transparency as well as let the potential buyer know how the vehicle was maintained through its life with FCC.

## **1.2 Research Problem & Research Question**

In order for Florida Crystals Corporation to be able to continue to farm their over 180,000 acre operation, they must optimally maintain their on-road fleet of Ford F-150 trucks, a critical asset for day-to-day operations. The current SAP SE vehicle tracking system makes it difficult to track day-to-day operations for the on-road fleet. SAP SE provides a history of data as well as the current inventory of the fleet at FCC. Stakeholders in the company are curious how the day-to-day operations of the Ford F-150 vehicle fleet are justified in order to get to the end product of what is produced. Fleet GPS tracking would allow for a birds eye view of the entire operation and would allow for executives to make uniform decisions to reduce operational costs, ensure safety, and provide an exceptional resale value on the vehicles in the fleet. Another important aspect is that it can monitor employees' driving habits. FCC could possibly implement a rewards program through monitoring these habits to help drivers improve and maintain them. Being connected to Ford Pro Telematics will allow management to collect data to make these decisions.

Thus, the overall purpose of this thesis is to assess the research question: Does Ford Pro Telematics provide Florida Crystals Corporation data and vehicle tracking benefits for its on-road vehicle fleet that will allow FCC to optimize the on-road vehicle fleet, reduce downtime and costs, and obtain a return on investment?

### **1.3 Research Objectives**

The overall objective and undertaking of this research is to provide upper management with the evidence that they are looking for to see how the fleet of on road vehicles are operating day-to-day. With evidence from Ford Pro Telematics for a select set of vehicles in the Ford F-150 vehicle fleet and research based on how it has benefitted other fleets, this research will allow for Florida Crystals Corporation to continue to grow and prosper for another 60 years. The specific objectives are as follows:

1. Evaluate a sample of FCC's company vehicles using the Ford Telematics tracking system based on a number of indicators and employee's driving habits.
2. Analyze the fuel costs of operating the vehicles throughout a harvest season with us, and develop metrics that drivers can follow to improve their habits.
3. Use the information gathered from Ford Pro Telematics to conduct a cost-benefit assessment for adopting the Ford Pro Telematics system for the company and examine return on investment.

Since FCC is a loyal Ford customer, they have taken on the interest in telematics through a demo to see how it can benefit the company, its employees, and their vehicles. Through this demo, FCC will be able to customize the overall use of this telematics system for the operation. With technological advances, they will be able to take further advantage

of the system by customizing it to FCC needs in the future. Currently, FCC is able to take advantage of the free demo on 10 of their vehicles to assess its benefits and costs.

Given the large size of FCC's fleet, several vehicles meet the criteria for the three month demo. It was decided to pick vehicles based on the aspects of different drivers – a Farm Director (driving a Ford F-150 XLT SuperCrew model), a Research and Development Manager (driving a Ford F-150 XL SuperCrew model), a Spray Crew Manager (driving a Ford F-150 XL Regular Cab model), and (7) Field Laborers (driving Ford F-150 XL Regular Cab models). These choices will allow for a fair assessment of vehicles from all positions throughout the company and provide a way to collect the necessary data for assessment and help implement if adopted. Investing in Ford Pro Telematics has the potential to provide economical savings for FCC's operations as long as the data collected is utilized in an organized manner to implement positive change.

#### **1.4 Outline of the Thesis**

This chapter provided purpose and motivation for undertaking this research as well as an outline of the research objectives. Chapter 2 provides details of why this research is important, describes the environment Florida Crystals Corporation's vehicles are operated in, reviews literature on fleet tracking devices that are available across a range of fleets throughout the world, and examines how Ford Pro Telematics influences the fleet at FCC. Chapter 3 discusses data provided by Ford Pro Telematics, metrics for assessment, and a framework for analyzing the impact and return on investment using the Ford Pro Telematics system. Chapter 4 presents the results of impact analyses, examining the impact of the Ford Pro Telematics system on the FCC on-road fleet, potential for cost reduction,

and return on investment. Chapter 5 provides an overall summary of findings, key takeaways, and details on how the results can help develop incentive programs for employees driving company vehicles, as well as improvements and information that is not provided by Ford Pro Telematics that could also be of use in decision making or adjustments to those incentive programs.

## CHAPTER II: LITERATURE REVIEW

Fleet telematics is an integrative platform that ties telecommunications, informatics, computer science, and vehicular technologies together creating a system that operates to collect and formulate insight from data, ultimately improving efficiency and safety for fleets (Heavy.AI n.d.). Fleet telematics has become a popular software and tool over the last decade among many industries. However, the technology has a long history dating back to the early 1960's when the United States and Soviet Union were engaged in the Cold War. The United States' government needed to protect and enhance its national security. The government developed global positioning system technology, or GPS. At this time, it was strictly used for military and intelligence use but became available to the public a decade later (Verisk 2016). As the technology developed, it became clear that use of GPS could improve the safety of drivers on the road. In 1993, GPS was made available from the government to the average consumer (Verisk 2016).

Today, fleet telematics has been introduced in many commercial sized fleets such as UPS, FedEx, USPS, amongst other fleets. Understandably, these industries want to know where their vehicles are at a given point in time to optimize movement of mail and packages, understand logistics, and ensure vehicles are being utilized to their full potential, all while ensuring proper vehicle upkeep and routine maintenance. However, organizations that operate smaller sized fleets often wonder if telematics is a good investment. Many of these organizations fear that it will not provide them more information than they already know. Their fleet may be too small to warrant the investment. In addition, other concerns include employees may not want to work for them if they are being tracked, the hardware

or software is too cumbersome or difficult to install and understand, or the information can be used against them from a legal standpoint if an accident was their employee's fault. Although these are all valid concerns, President Ronald Reagan once said, "Trust, but verify" (Rhino Fleet Tracking n.d.).

Fleet tracking is a very important part of operating a fleet. Being overly concerned that the system will not tell one more than is already known is essentially a myth – unless one is sitting alongside a driver each day, one will not know how they are operating that vehicle. Although a fleet may be small in size, it does not mean that fleet telematics will not be beneficial. Organizations should trust, but verify that the software is beneficial for them for their particular situation. Small private fleet managers' and administrators' ability to implement telematics data to their advantage and benefit is a gap that needs to be bridged in the world of fleet tracking.

## **2.1 Adoption of Fleet Tracking**

Agriculture utilizes a wide range of technology in all facets today. From precision agriculture, used in heavy equipment such as tractors and combine harvesters to optimize machine performance and efficiency in the field, to soil sampling and testing for different nutrient needs to enhance crop yields. Much like these technologies, fleet tracking can be useful in helping to optimize how efficiently a vehicle is being used by an employee. Fleet tracking begins with hardware and software installed into a specific vehicle. After installation, the system allows information and data to be collected through a management portal. Fleet managers and administration can then use that data to make decisions on how their fleet should be taken care of. The benefits from adopting this tracking technology can

be evidenced in meeting the different needs of a fleet, while the costs are based on the initial purchase cost, the software maintenance, and resale value when the vehicle has reached its end of life. Not only do these topics make sense for business purposes, it can also benefit the drivers of the vehicles to enhance their safety as well as the safety of others on the road.

The hardware and software components for fleet tracking and telematics make it easy to customize to a specific operation. Telematics technology can provide cost savings to operations utilizing it the correct way. Telemetry for starters, provides managers the ability to pinpoint where vehicles are located at any given point in time. To manage its fleet, the Virginia EMS agency has implemented a cloud-based system of telemetry (Edinger 2021). When Covid-19 first hit, there was a fear that having this system on their fleet would not help since most employees were working from home. However, it actually benefitted remote workers at Virginia EMS to view the fleet from a cloud-based standpoint as long as they had an internet connection (Edinger 2021). The system was initially purchased to cut back on the amount of manual entry that their field staff were doing. From preventative maintenance plans, to fuel reports, to calling around to see where certain vehicles were at or who was driving them, it was time consuming and costly to enter information and data manually. Manual entry also suffered from human error. Mr. Bill Westerman, the VP of product management who oversees the system that Virginia EMS installed explains that a managing unit is installed inside of a vehicle's OBD connector which connects it to the cloud to transmit information (Edinger 2021). The OBD connector is capable of sending driver habits, vehicle location, fault codes the vehicle may throw, and even fuel receipts

and mileage during the time of fill ups. The idea is not to follow or track drivers, but help them understand the condition of their fleet as well as monitor the use of vehicles. They have found that there are even vehicles that do not see much use and were able to consider reducing the fleet size in their next round of purchases (Edinger 2021).

For Amazon and their delivery vehicle fleet that is continuously growing, they are able to match package deliveries to the smartest route from their warehouses to ensure that they are optimizing quickest delivery and taking advantage of fuel savings, as well as wear and tear on their vehicles from use of telematics. Another benefit to this is that customers can follow the status of when their package will be delivered, enhancing customer satisfaction (Collins 2021).

When it comes to agricultural applications, and long hours spent in the field, vehicles can be monitored to reduce the amount of idle time an employee may be running their vehicle, which can reduce fuel costs and preventative maintenance costs such as oil changes – the longer the vehicle is operated, or idle, it inevitably increases the preventative maintenance intervals. Above all, implanting fleet tracking and telematics can reduce costs all while increasing optimization and efficiency.

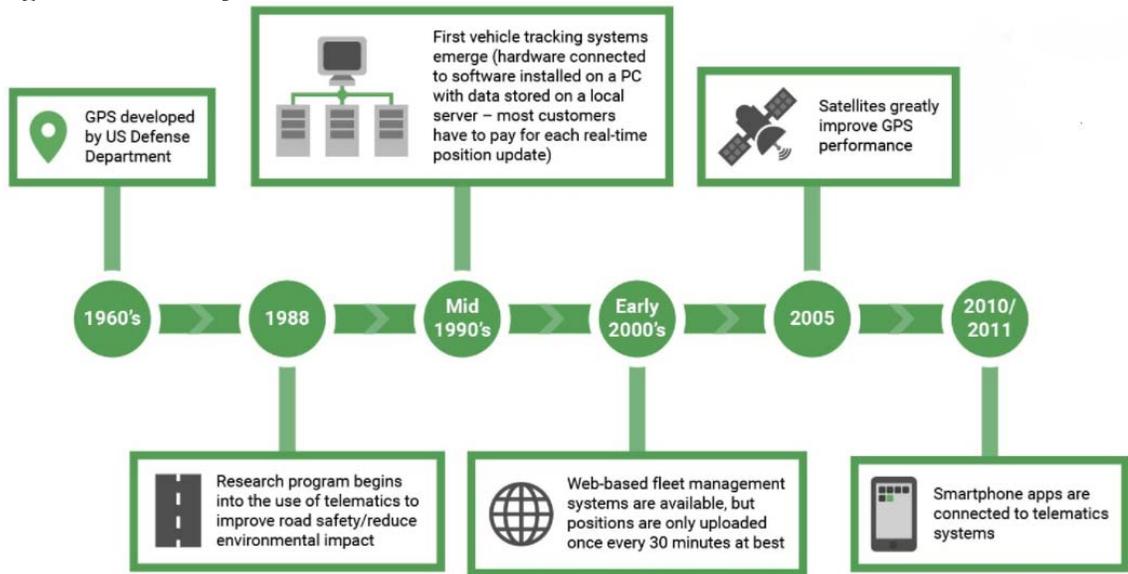
## **2.2 History of Fleet Tracking With Telematics**

Beginning in the 1960s, the United States Defense Department, had a need for enhanced security during the Cold War and developed GPS. However, it wasn't until the late 1970's and early 1980's when Controller Area Network technology (CAN bus) was introduced, allowing for enhanced electronics to be installed in automobiles. These enhanced electronics allowed for mechanics and technicians to be able to diagnose fault

codes and engine issues, which made preventative maintenance and repairs easier and quicker. Telematics was introduced around this era and consisted of the merging of - “telecommunications and information processing” (Quartix 2018). The introduction of telematics was the onset for many research programs that had objectives of enhancing road safety and reducing negative impacts on the environment from fleet operation. From the mid-1990’s to early 2000’s, the implementation of tracking systems emerged (Quartix 2018). It allowed for connecting a piece of hardware to an asset, which fed information back to a PC through special software. Although it was advanced technology for its time, it was limited. In some cases, management systems would only allow for information to be provided in half hour increments of time (Quartix 2018). This meant that although one could see that a vehicle was in a certain area, it may be 40 miles away in real time from when the hardware last pinged back to the software. As technology advanced, and more GPS satellites became available, it has helped to substantially reduce this pinging time frame to real time (Quartix 2018).

The introduction of the smartphone in the mid-2000’s, provided application based technology to connect to telematics from a remote location and allowed for tracking on the go (Quartix 2018). The industry started to become more popular for fleet tracking due to its ease of use. However, it was still being enhanced. There were several companies out there that provided technology that did not work in remote locations where satellite connectivity was poor. Every year, something new went on the market, investing into the technology was often not justifiable if one had to upgrade year-to-year to ensure reliability. Figure 2.1 lays out the timeline of the history of telematics.

**Figure 2.1 History of Telematics**



Source: Quartix 2018

Today, many OEM manufacturers have taken it upon themselves to introduce their own versions of telematics and fleet tracking. Ford has now integrated smart systems in their vehicles that are available through a monthly subscription if the purchaser desires to have it turned on with the initial purchase of the vehicle. It is safe, reliable, and even receives push updates so that operators and fleet managers have peace of mind that their technology is the latest released.

### **2.2.1 Operational Aspects of Fleet Telematics**

Fleet telematics are used in a variety of different business operations today. It is very customizable to how different fleets operate and begins with what a fleet manager or organization wants to see in their fleet to ultimately optimize and have the most efficient fleet they can. Beginning with finding the right technology to suit business needs, the organization installs the hardware into the vehicles they want to track or in some cases, the hardware is already on board from the factory (in the case of Ford Pro Telematics) through

the On Board Diagnostics location (OBD). From there, data is collected or can be viewed in real time when a vehicle is in operation. Fleet managers can utilize the data collected to schedule preventative maintenance plans, proper routing of day to day activities, and add in geofencing, so that vehicles are not being operated in places they are not supposed to be. Areas of safety monitoring include, but are not limited to, monitoring driving habits such as hard braking, aggressive acceleration, wearing their seatbelts, and that drivers are following the posted speed limits. Figure 2.2 shows how simple a set up of telematics can be done if there is not an onboard system from factory already on the vehicle.

**Figure 2.2 Telematics Installation and Use**



Source: Geotab Team 2017

There are typically two fees involved with setting up telematics on a specific vehicle – the first being the purchase of the hardware, and the second being the monthly or yearly subscription to the software for collection of data depending on the contract associated with the subscription. Much like a cellular phone plan, the telematics device and data plan works the same way.

Fleet management has become easier for organizations because of this real time view from one dashboard instead of having multiple sources to manage their fleets. Organization is key to ensuring their fleets are optimized and these tools allow for that. The technology allows managers to minimize downtime from vehicle breakdowns and ensures that day to day operations run more efficiently, addressing many issues before they become larger problems. Being able to deliver when a job has to be done is key for the operations at Florida Crystals Corporation and vehicle downtime can affect profitability when an employee cannot make it to that job due to downtime. Telematics can ensure internal employee satisfaction as well as enhance organization and profitability.

Ensuring that the latest technology is available for vehicle telematics is crucial to the user experience when it comes to data collection. Much like how cell phones, laptop computers, smart TV's, and similar devices receive updates from the manufacturers, vehicle software updates are just as important. As vehicles become more and more connected, manufacturers such as Ford are pushing updates remotely through a system called Over-the-Air Car Updates (AUTOCRYPT 2021). Not only are these updates focused on telematics software, but because the average vehicle now contains more than one hundred electronic control units or computer chips, it also addresses updates on many other vehicle systems. Many different computer chips control and monitor specific areas of the vehicle from the powertrain features like driver assistance to the four wheel drive/traction control systems for driver safety (AUTOCRYPT 2021). Although these features were options on higher level packages in the past, manufacturers are now including them in many of their base models. Several manufacturers have had to deal with

emergency recalls when it comes to software. In 2016, 46% of recalls in the auto industry were software related (AUTOCRYPT 2021). This has led to an increase in downtime for owners. Mercedes-Benz for example, had approximately 42,000 recalls on their SUVs in North America, which was related to software on its Electronic Stability Program, “a feature that applies a twisting force to one of the car’s front wheels so that the car can pull itself towards the turning direction during sharp turns to maintain stability and comfort of the vehicle” (AUTOCRYPT 2021).

There are many areas to help ensure a return on investment into telematics systems. Fuel savings are a significant benefit. Telematics can provide fleet managers the ability to see who is operating a vehicle with aggressive acceleration, unnecessary idling, and high speeds. The average cost of gasoline over the last decade has fluctuated quite a bit (Table 2.1). Although FCC cannot control the price of gas from a consumer standpoint, they can control how they utilize it in their vehicles.

**Table 2.1: U.S. All Grades All Formulations Retail Gasoline Prices (Dollars per Gallon)**

Decade	Year-0	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9
2000's	\$1.52	\$1.46	\$1.39	\$1.60	\$1.90	\$2.31	\$2.62	\$2.84	\$3.30	\$2.41
2010's	\$2.84	\$3.58	\$3.68	\$3.58	\$3.44	\$2.52	\$2.25	\$2.53	\$2.81	\$2.69
2020's	\$2.26	\$3.10								

Source: U.S Energy Information Administration 2022

Depending on a specific job, idling a vehicle can be avoided when a driver has come to a stop and will not be moving after approximately three to five minutes. The average vehicle will utilize one gallon of fuel per hour when left idling (WEBMECHANIX 2017). Idling is not just stopping a vehicle in a parking spot or job site, it also includes being stopped at a traffic light, stop sign, or in everyday bumper to bumper traffic. Idling

can be reduced by best practices and monitoring it through telematics. Consider a gallon of fuel per week that is burned due to idling over the course of a year. That is 52 gallons of fuel. At \$3.10 per gallon (U.S Energy Information Administration 2022) that amounts to \$161 annually per vehicle. Based on these estimates, a subscription to an online portal may be covered by potential fuel savings.

The increasing pressure from the government for organizations to reduce their carbon footprint is a regulatory source that is putting pressure on industry to reduce fossil fuel use. According to Solera Fleet Solutions and WEBMECHANIX, nearly all states have at least one incentive or law in place to reduce idling. Colorado provides tax credits for qualified idle reduction technologies, known as “The Green Truck Grant Program.” The program provides up to 25% in rebates to interstate commercial operators who reduce their emissions (WEBMECHANIX 2017). With Ford Pro Telematics, reducing fuel consumption from idling would provide a reduction in unnecessary emissions from FCC’s operations.

More and more organizations are adopting telematics for their vehicle fleets to have a better understanding of the way their fleet is operating. As technology has advanced it has made it easier for these organizations to adapt it to their fleets. As newer vehicles are manufactured, many of them already have the hardware ready to adapt the telematics outside of a consumer or organization paying for the subscription to utilize it. It is evident that it is becoming easier to access telematics for a fleet.

### **2.3 Ford Fleet Telematics**

Ford launched its first telematics platform on June 11, 2020 (Ford Media Center 2020). The software is designed for fleet managers to be able to operate and control their fleets more efficiently. The service provides real time odometer readings, engine hours and oil life, diagnostic codes and warnings, it also sends push notifications for recalls, and preventative maintenance alerts (Ford 2021). Fleet managers are kept up to date with push notifications and warnings so that they can address issues faster, which in turn improves uptime and can potentially avoid high dollar repairs. This information is provided to fleet managers through a dashboard on a computer that can help them understand the status of their fleet without having to rely on their drivers to report the issues (Ford 2021).

According to Brent West, general manager of Ford Pro Intelligence, “No matter how big or small a commercial fleet may be, vehicle data plays an important role in improving uptime and efficiency. It can provide fleet managers with key information and abilities through an intuitive interface (Ford 2021).” Providing information about the vehicles in the fleet is key for managers to be able to make the right choices on how to handle drivers’ habits. This can help to increase the efficiency and life of a vehicle, as well as, reduce downtime. The purpose of Ford Pro Telematics and being able to monitor vehicles from a dashboard is to link in with Ford’s dealer system to be able to schedule maintenance and services through a direct link once they receive an alert that a specific vehicle needs service. The specific warning can put them on the schedule with the right dealership and technician to ensure the quickest possible service is performed (Ford 2021).

With the introduction of electric vehicles, specifically Ford's E-Transit and F-150 Lightning Pro, the ability to manage and control energy costs through charging is available in the same dashboard. Fleet managers and drivers can monitor battery range and charger locations, as well as, state of charge and energy consumptions to allow for assurance that vehicles are charged and ready for their daily tasks.

The technology provides several benefits for a fleet and will allow for organizations to adjust their business practices not only for preventative maintenance programs, but also incentive programs for safe driving. Ford Pro Telematics can provide fleet managers a driver score card each month to see how their drivers are doing. With that report card, driver coaching can be done to enhance problematic areas and get them back on a safer track to operate the way the organization intended. According to Mark Herbert, "Incentive programs provide a structured use of rewards and recognition to motivate desired behavior from a specific group of people" (Herbert 2019). The idea is to reward good behavior where warranted and when an organization does this, employees will continue to repeat their good behavior with a vision that they will be incentivized if they keep up that good behavior. In the words of Simon Sinek, "There are only two ways to influence human behavior: you can manipulate it or you can inspire it" (Bell n.d.). Incentive programs can influence a reduction in turnover as a result of happier employees, they can create morale amongst team members, and enhance a company's reputation since employees will likely represent the brand with a positive attitude (Bell n.d.).

Although Ford Pro Telematics has many benefits, as with any new technology it has costs associated with it. The technology can only retrofit back to certain model year vehicles.

Ford Telematics continues to expand its feature offerings, but the remote update capability will not be ready until 2022 (Automotive Fleet Staff 2021). With all of the different features available to fleet managers, it will take some time to figure out what works best for their operation and what way they can tailor it to best fit their needs. There are also challenges in retrofitting older vehicles since the onboard diagnostics has to be accepted through the dashboard when the vehicle is turned on. What this means is, the driver of the vehicle has to be trained on how to navigate through the dashboard to turn the telematics feature on. With a smaller fleet, this task is easier, but when considering a larger fleet, it can be more complicated. If an organization wanted to set benchmarks to older vehicles and how they are operating compared to newer vehicles, the complication then comes into managing two platforms, the newer version and retrofitted version. The newer version may provide more information than the retrofitted version in some cases and has the potential to skew those benchmarking practices.

Another challenge with technology is the fact that hardware is constantly evolving. For example, the latest version of Ford Pro Telematics will only work with 2020 model vehicles and newer. Therefore, fleet managers will need to keep up with the latest hardware as technology advances and ensure that the hardware they have allows for the most up to date information to be fed to the software and or platform the data is feeding to. Although Florida Crystals Corporation has a secure VPN system, this can also create a challenge for IT to be sure there are no data or security breaches from outside the organization. Ford should continue to look into ways to retrofit other vehicles while enhancing the technology on newer

models. Ford's IT team will need to support end users and build relationships with them to understand how they can improve the technology they are using.

In conclusion, it is recognized that there are many benefits associated with the implementation of Ford Pro Telematics for FCC. The costs that need to be recognized are the monthly subscription to have each vehicle on the Ford Pro Telematics dashboard and potential need for installation of hardware. To assess if the cost of investment is beneficial, the information FCC is receiving from the telematics and the decisions that can be made from it to initiate positive change within the fleet must be assessed. Although there are challenges associated with change, and hurdles with technology when it comes to older vehicles in the fleet, the next chapter will illustrate how the benefits outweigh the challenges.

## **CHAPTER III: DATA AND METHODS**

This chapter will present the data from the Ford Pro Telematics demo that Florida Crystals Corporation is currently undergoing which will be used for analysis. The demo offers significant data on each of the F-150 pickup trucks selected that will be helpful in guiding the operations management team to understand how to optimize best practices for the fleet.

The chapter is divided into two sections. Section 3.1 will present a description of the data available from Ford Pro Telematics. Section 3.2 will describe how the data can be analyzed and used to inform operations management how the fleet is operating. This section will also illustrate where improvements can be made if adjustments are implemented on the selected trucks, while providing an opportunity to better the operation of the fleet.

### **3.1 Ford Pro Telematics Data**

With a fleet of 500 vehicles, Florida Crystals Corporation was given the opportunity to demo Ford Pro Telematics on 10 of their F-150 pickup trucks. The Ford Pro Telematics demo is an opportunity to have access to each vehicle's performance and driver habits from an online platform. Data collection is available 24 hours a day, seven days a week from a real-time dashboard. The 10 vehicles and their drivers that were chosen are shown in Table 3.1. Because FCC's fleet consists primarily of F-150 Regular Cab XL 4X4 trucks, the sample for the demo uses 80% of this model but takes into consideration two other model trucks that are in the fleet; the F-150 Super Cab 4X4 XL, and the F-150 Super Crew 4X4 XLT. The regular cab model is provided to the field laborers, the super cab model is provided to

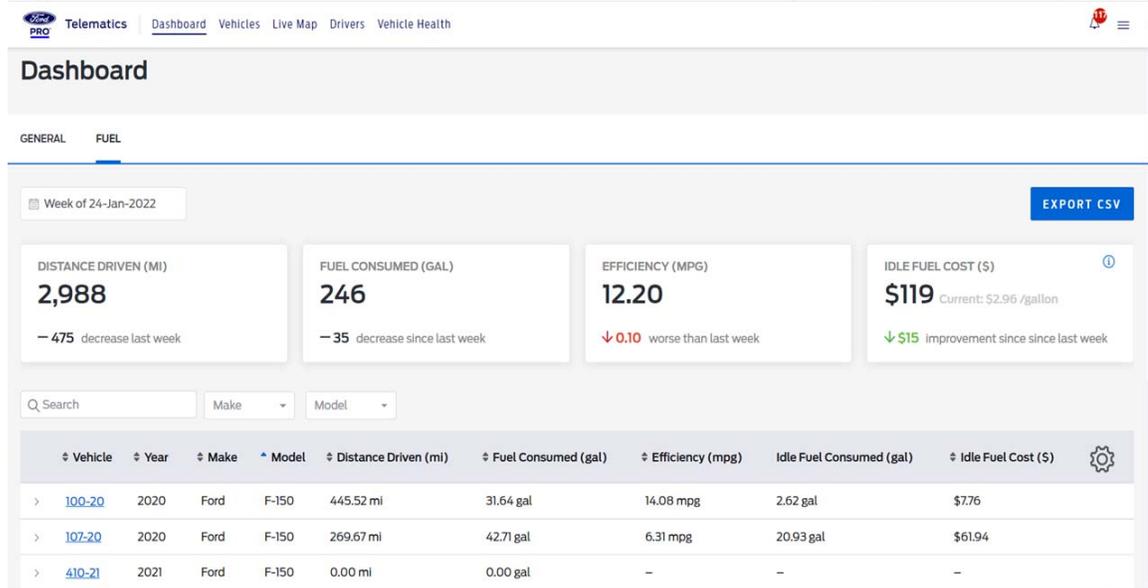
managers, and the super crew model is provided to directors. This means that the different model trucks will be reviewed with respect to the position they are in, which can affect usage, wear and tear, driver habits, and overall vehicle performance.

**Table 3.1: F-150 Pickup and Assigned Driver**

<b>Location</b>	<b>Driver</b>	<b>Model Year</b>	<b>ID #</b>	<b>Make</b>	<b>Model</b>	<b>Serial #</b>
Sugar Farms	Laborer 1	2020	239-20	FORD	Regular Cab 4X4 XL	1FTMF1E56LKE75221
Sugar Farms	Laborer 2	2020	100-20	FORD	Regular Cab 4X4 XL	1FTMF1E54LKE75217
Okeelanta Farms	Laborer 3	2020	107-20	FORD	Regular Cab 4X4 XL	1FTMF1E50LKE75215
Osceola Farms	Laborer 4	2020	601-20	FORD	Regular Cab 4X4 XL	1FDRF3G60LEE11189
Osceola Farms	Laborer 5	2020	406-20	FORD	Regular Cab 4X4 XL	1FTMF1E51LKE75188
Osceola Farms	Laborer 6	2021	410-21	FORD	Regular Cab 4X4 XL	1FTMF1E55MKE59044
Okeelanta Farms	Laborer 7	2021	436-21	FORD	Regular Cab 4X4 XL	1FTMF1E59MKE59029
Sugar Farms	Laborer 8	2021	445-21	FORD	Regular Cab 4X4 XL	1FTMF1E57MKE59014
Sugar Farms	Manager 1	2020	294-20	FORD	Super Cab 4X4 XL	1FT7W2B65LEE00234
Okeelanta Farms	Director 1	2020	368-20	FORD	Super Crew 4X4 XLT	1FTEW1E53LKE75228

Ford Pro Telematics offers an abundance of different ways to observe a specific vehicle’s performance, health, and driver habits. The area of focus for this study will be fuel (driving vs. idle) (Figures 3.1 and 3.2), utilization of the vehicle (road map of driver’s day relating to their job) (Figure 3.3), safety (seat belt being worn, traveling at posted speed limits, etc.) (Figures 3.4 and 3.5), and vehicle health (oil changes and preventative maintenance records) (Figures 3.6 and 3.7).

**Figure 3.1 Ford Pro Telematics Dashboard – Fuel Consumption (Drive vs. Idle)**



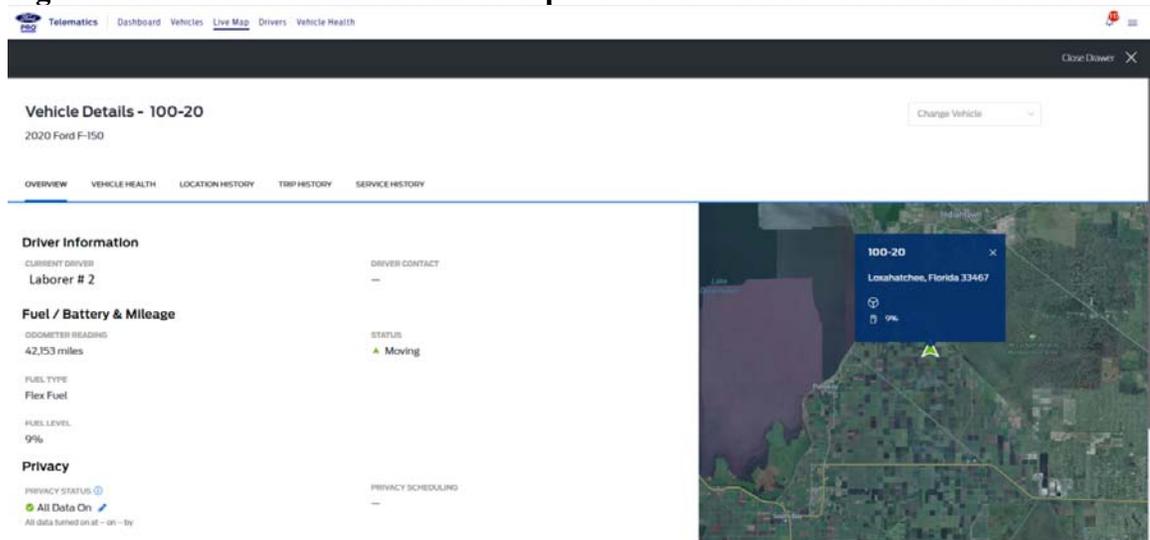
Source: Ford Pro Telematics 2022 (a)

Once logged into the Ford Pro Telematics home page, the dashboard provides a weekly overview of the selected vehicles fuel usage, whether fuel was consumed in miles per gallon (MPG) while the vehicle was in motion, or in idle consumption. Each vehicle has an overview of what fuel costs are while the vehicle is idling. For example, Laborer #6, in truck #410-21, was on vacation this particular week, so they consumed 0.00 gallons of fuel,

whereas, Laborer #2, in truck #100-20, consumed 31.64 gallons and only 2.62 gallons were consumed while the vehicle was idling. Laborer #3, in truck #107-20, consumed 20.93 gallons while idling - a significantly higher cost of \$61.94 compared to Laborer #2, which had a cost of \$7.76 from idling. The dashboard also provides details and week-to-week comparisons for efficiency. Figure 3.1 details the week of January 24<sup>th</sup>, 2022, showing that the efficiency in MPG was down by 10% and the idle costs improved by \$15 from the previous week.

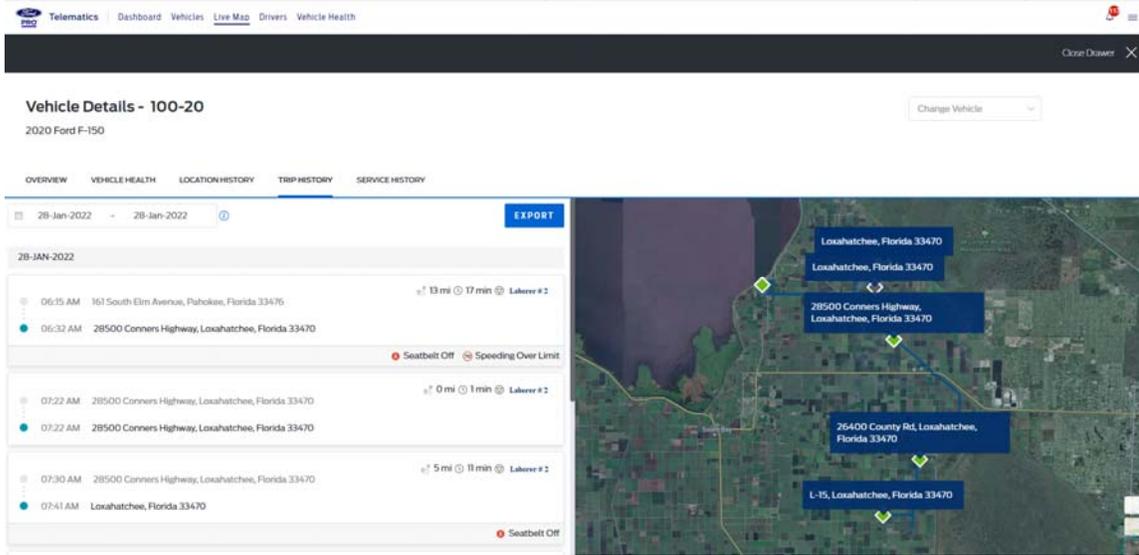
In other areas of the dashboard, management can dive into the driver’s current location. Laborer #2’s location is shown in Figure 3.2 moving north in Loxahatchee, Florida. While Figure 3.3 provides the trip history of Laborer #2’s day on January 28, 2022, and the different areas they stopped for certain jobs.

**Figure 3.2 Ford Pro Telematics Live Map – Overview of Drivers Current Location**



Source: Ford Pro Telematics 2022 (b)

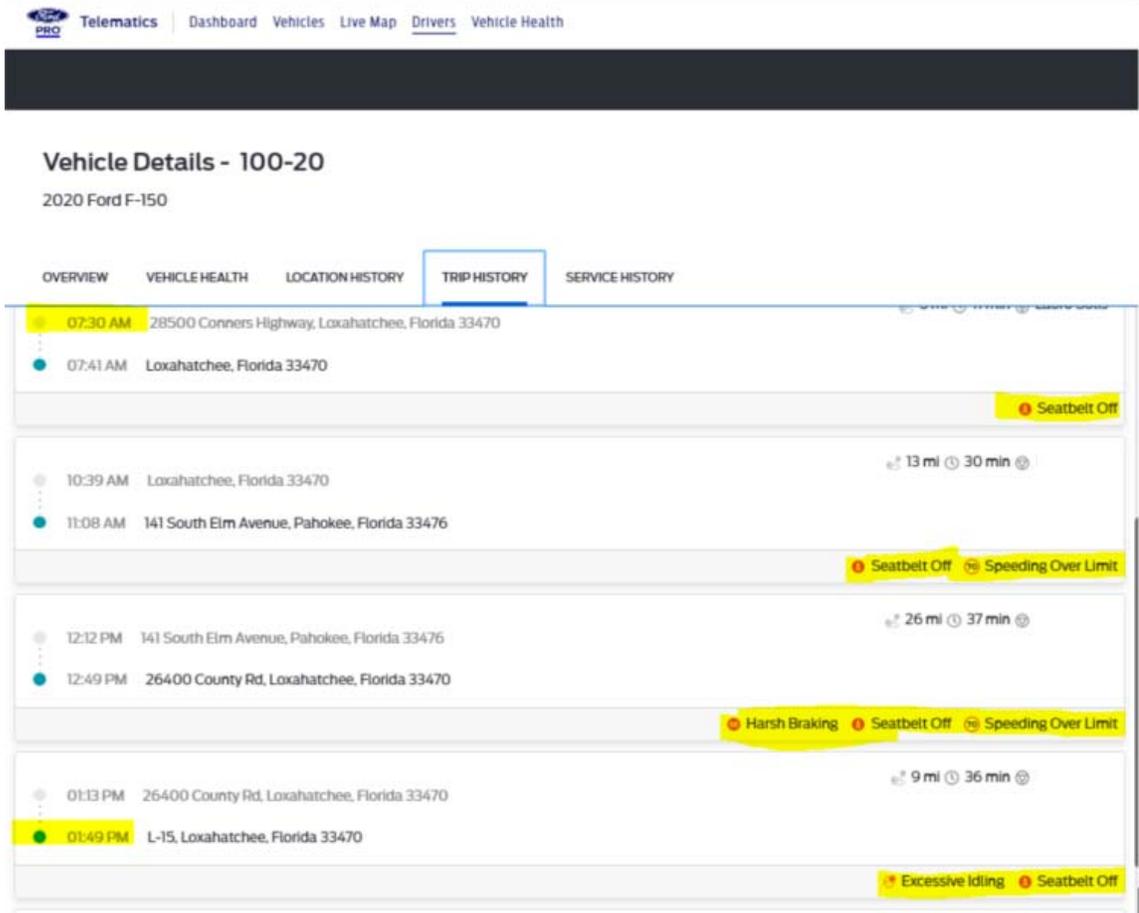
**Figure 3.3 Ford Pro Telematics Live Map – Overview of Drivers Trip History**



Source: Ford Pro Telematics 2022 (c)

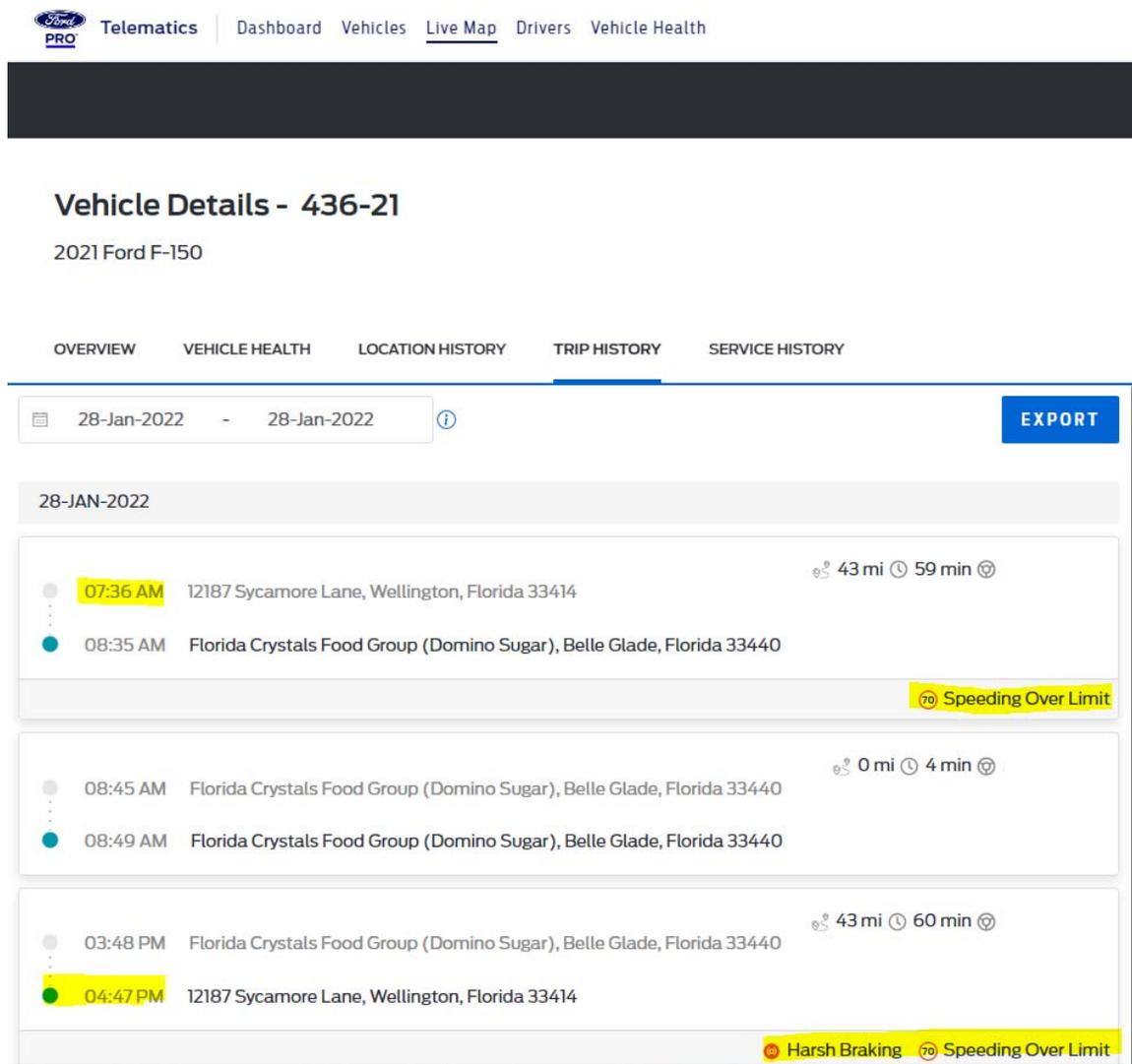
From Figure 3.4, management is able to see that Laborer #2 did not wear their seatbelt over the course of the day from when he began work at 7:30 AM, through approximately 1:49 PM. The employee also was marked for going over the posted speed limit of 70 MPH in two instances, had a harsh braking event, and an excessive idle event. Figure 3.5 shows Laborer #7 was also flagged for speeding over the posted speed limit of 70 MPH and a harsh braking event, but was wearing their seatbelt for the duration of the entire day as there were no flags shown regarding the seatbelt not being worn.

**Figure 3.4 Ford Pro Telematics Live Map – Overview of Drivers Safety**



Source: Ford Pro Telematics 2022 (c)

**Figure 3.5 Ford Pro Telematics Live Map – Overview of Drivers Safety**

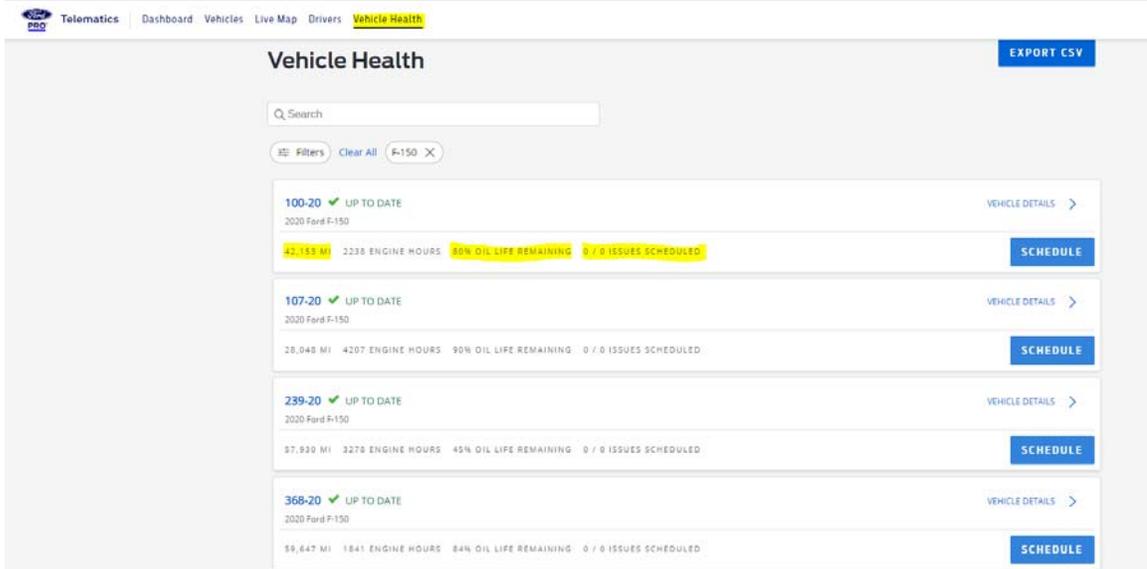


Source: Ford Pro Telematics 2022 (c)

The vehicle health status can be seen in Figures 3.6 and 3.7. Figure 3.6 shows an overview of the entire fleet on the demo for easy reference, and a quick look at mileage, remaining oil life, and any issues reported/scheduled. Figure 3.7 shows how a manager can utilize the dashboard to dive into a specific vehicle for its service history. The vehicle health

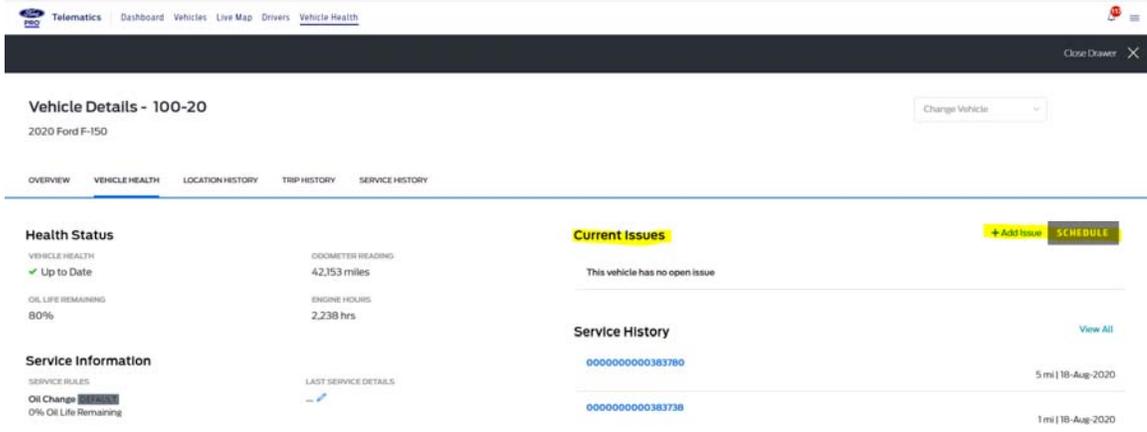
section also allows the manager to schedule upcoming maintenance or report an issue so that it may be addressed when service is scheduled.

**Figure 3.6 Ford Pro Telematics Vehicle Health – Overview**



Source: Ford Pro Telematics 2022 (d)

**Figure 3.7 Ford Pro Telematics Vehicle Health – Vehicle Details**



Source: Ford Pro Telematics 2022 (d)

### **3.2 Analytical Methods**

The available statistics of vehicles from Ford Pro Telematics will allow for an analytical approach to examining how the fleet of F-150 pickup trucks and drivers operate. Data was collected over the month of January from the demo with Ford Pro Telematics and evaluated based on different operations each driver was involved in. The data from Ford Pro Telematics was compared and contrasted against the last year's harvest season (October 2020 through March 2021), which came from SAP SE. Last year's data was averaged to obtain a monthly average over the six month basis to compare it against the Ford Pro Telematics data from January 2022. It is understood that because each driver holds a different position and operates in different areas of the farm, there will be deviations on driving habits. Given this heterogeneity and farming conditions year-to-year, a sensitivity analysis was conducted to understand how practices may affect costs under different conditions. The sensitivity analysis conducted is further elaborated on in Chapter 4.

By being able to group data together from the Ford Pro Telematics dashboard, it is easy to monitor and understand fuel usage, utilization of vehicles based on day-to-day operations, driver safety based on their driving habits, and vehicle health to ensure preventative maintenance is being completed on time. These indicators are important because they all tie back to costs of owning the vehicle. If Florida Crystals Corporation can monitor and control these indicators, they can prolong the life of the vehicle and optimize day-to-day operations in the safest way possible.

## CHAPTER IV: RESULTS AND DISCUSSION

This chapter will present analysis of data from the Florida Crystals Corporation Ford Pro Telematics demo to understand how it could help FCC better manage its vehicle fleet. While the demo is limited to 10 vehicles, the data can provide enough information to assess the impact on the Ford F-150 fleet on a marginal basis. From the data collected, there are two primary economic influences – fuel and preventative maintenance intervals. If FCC can cut down on the use of fuel, cost savings will result. If FCC can maintain upkeep and meet preventative maintenance intervals, it will reduce the chance for premature failures and costly vehicle repairs. Other data, such as driver location, drivers' daily routes, and driver safety, are added benefits that do not necessarily have a direct economic impact that is easily calculated based on the demo, but the data can provide management with details to ensure that employees are completing their daily tasks in the most efficient way possible (e.g., taking the shortest routes possible to save fuel and additional wear and tear on vehicles). These factors will also affect the employees' overall driving scorecard which can be used for incentive programs to reward good behavior. These additional qualitative elements will be discussed.

### **4.1 Fuel Efficiency and Idling Costs**

The 10 F-150's from the Ford Pro Telematics demo were operated for a total of 17,227.33 miles during the month of January, 2022. Table 4.1 illustrates each driver's total distance driven, total gallons used, the efficiency of the fuel being used, gallons of fuel burned while idling, and the cost of the idle time for the duration of the month. Efficiency is defined as the miles per gallon the vehicle achieved, in other words, total miles divided

by gallons used. The cost of idling is found by the amount of gallons used idling multiplied by the average cost of fuel for the month of January which was \$2.96. The average total mileage for the 10 vehicles was 1,723 miles with a standard deviation of 1,257 miles. The average total gallons of fuel used was 175 gallons with a standard deviation of 80 gallons. Average fuel efficiency was 10 MPG, with a standard deviation of 4.64 MPG. Average gallons used when idling was 21.6 gallons for the month with a standard deviation of 25 gallons. Finally, the average cost for idling per vehicle per month was \$63.94, with a standard deviation of \$74.60.

In comparison to the harvest season from October 1, 2020 through March 31, 2021, Table 4.2 illustrates each driver's monthly average distance driven, average gallons used, and the average efficiency of the fuel being used, as well as an estimated average idle gallons burned and the total cost of idle time for the duration of that period of time. This data was pulled from SAP SE since the Ford Pro Telematics demo was not available at this time. For comparison purposes, the same fuel price was used for Table 4.2 at \$2.96 per gallon (the price of fuel was actually \$2.84 per gallon, down \$.012). The average total mileage for the 10 vehicles was 2,176 miles with a standard deviation of 1,014 miles. The average total gallons of fuel used was 176 gallons with a standard deviation of 88 gallons. Average fuel efficiency was 14.14 MPG, with a standard deviation of 4.64 MPG. Gallons used when idling had an average of 23 gallons, with a standard deviation of 25 gallons. The cost of fuel used during idling equated an average of \$67.13 per vehicle per month, with a standard deviation of \$74.26.

Comparing Tables 4.1 and 4.2, it is recognized that there are slight differences between the 10 vehicles and between the periods analyzed. The average total miles was 453 miles higher for the six month period based on the monthly average. The average total gallons was higher by one gallon and the average fuel efficiency was 4.14 MPG higher when comparing the demo to the monthly average over the prior period examined. Average gallons used when idling was 1.08 gallons higher and the cost of idling was higher by \$3.19.

Taking into consideration that farming practices for Florida Crystals Corporation vary year-to-year based on weather, crop rotation, different varieties of cane, to name a few, the mileage and fuel usage will vary as well. As seen in each table, laborers have a significant influence on the results. Their average mileages are very different from Table 4.1 to Table 4.2, however, the average idle gallons are very similar. A fuel sensitivity analysis is a way to show how much idling the vehicles can affect vehicular costs. Focusing on the Ford Pro Telematics data, Table 4.3 takes the data assumptions provided from Table 4.1 to run the sensitivity analysis shown in Table 4.4. Using the average idle gallons for the 10 vehicles per month (21.6 gallons), and price per gallon (\$2.96) it was found that the average total cost to idle is \$63.94 per vehicle for the month of January. If each vehicle averaged that, the total cost would be \$639.40. However, it is not always going to be perfect as practices continue to change and fuel prices continue to vary, which the sensitivity analysis can capture.

**Table 4.1: Mileage Driven vs. Fuel Efficiency For the Entire Month of January, 2022**

<b>Location/Estimate</b>	<b>Driver</b>	<b>Model Year</b>	<b>ID #</b>	<b>Make</b>	<b>Distance (Miles)</b>	<b>Fuel (Gal)</b>	<b>MPG</b>	<b>Idle Fuel (Gal)</b>	<b>Idle Cost (\$)</b>
<b>Sugar Farms</b>	Laborer 1	2020	239-20	FORD	940.10	169.38	5.55	5.19	15.36
<b>Sugar Farms</b>	Laborer 2	2020	100-20	FORD	1,321.02	97.68	13.52	10.79	31.94
<b>Okeelanta Farms</b>	Laborer 3	2020	107-20	FORD	1,320.00	176.85	7.46	79.76	236.09
<b>Osceola Farms</b>	Laborer 4	2020	601-20	FORD	2,025.67	265.73	7.62	62.13	183.90
<b>Osceola Farms</b>	Laborer 5	2020	406-20	FORD	433.10	29.23	14.82	5.19	15.36
<b>Osceola Farms</b>	Laborer 6	2021	410-21	FORD	900.92	162.99	5.53	12.22	36.17
<b>Okeelanta Farms</b>	Laborer 7	2021	436-21	FORD	1,330.43	181.94	7.31	11.90	35.22
<b>Sugar Farms</b>	Laborer 8	2021	445-21	FORD	850.93	144.16	5.90	14.47	42.83
<b>Sugar Farms</b>	Manager 1	2020	294-20	FORD	4,630.45	341.82	13.55	10.83	32.06
<b>Okeelanta Farms</b>	Director 1	2020	368-20	FORD	3,474.71	177.59	19.57	3.55	10.51
<b>Mean</b>					1,722.73	174.74	10.08	21.60	63.94
<b>Standard Deviation</b>					1,257.16	80.29	4.64	25.21	74.62
<b>CV</b>					72.97%	45.95%	46.04%	116.70%	116.70%

**Table 4.2: Average Monthly Mileage Driven vs. Fuel Efficiency October 2020 – March 2021**

<b>Location/Estimate</b>	<b>Driver</b>	<b>Model Year</b>	<b>ID #</b>	<b>Make</b>	<b>Distance (Miles)</b>	<b>Fuel (Gal)</b>	<b>MPG</b>	<b>Idle Fuel (Gal)</b>	<b>Idle Cost (\$)</b>
<b>Sugar Farms</b>	Laborer 1	2020	239-20	FORD	4,038.50	311.30	12.97	5.53	16.38
<b>Sugar Farms</b>	Laborer 2	2020	100-20	FORD	2,463.83	183.50	13.43	11.46	33.91
<b>Okeelanta Farms</b>	Laborer 3	2020	107-20	FORD	1,874.00	241.50	7.76	80.90	239.46
<b>Osceola Farms</b>	Laborer 4	2020	601-20	FORD	2,015.33	269.72	7.47	61.41	181.76
<b>Osceola Farms</b>	Laborer 5	2020	406-20	FORD	1,950.00	182.43	10.69	6.12	18.12
<b>Osceola Farms</b>	Laborer 6	2021	410-21	FORD	753.00	38.67	19.47	12.68	37.54
<b>Okeelanta Farms</b>	Laborer 7	2021	436-21	FORD	1,196.83	63.33	18.90	12.08	35.77
<b>Sugar Farms</b>	Laborer 8	2021	445-21	FORD	1,575.67	73.33	21.49	21.97	65.03
<b>Sugar Farms</b>	Manager 1	2020	294-20	FORD	1,937.00	158.00	12.26	10.94	32.39
<b>Okeelanta Farms</b>	Director 1	2020	368-20	FORD	3,958.50	233.52	16.95	3.69	10.92
<b>Mean</b>					2,176.27	175.53	14.14	22.68	67.13
<b>Standard Deviation</b>					1,014.81	87.86	4.64	25.09	74.26
<b>CV</b>					46.63%	50.06%	32.83%	110.63%	110.63%

**Table 4.3 Assumptions – For the Entire Month of January, 2022**

<b>Assumptions</b>	
<b>Average Miles Driven</b>	1,722.73
<b>Average Gallons Used</b>	174.74
<b>Average Idle Gallons</b>	21.60
<b>Price Per Gallon</b>	\$2.96
<b>Average Total Cost to Idle</b>	\$63.94
<b>Average Cost to Idle (10) Trucks</b>	\$639.36

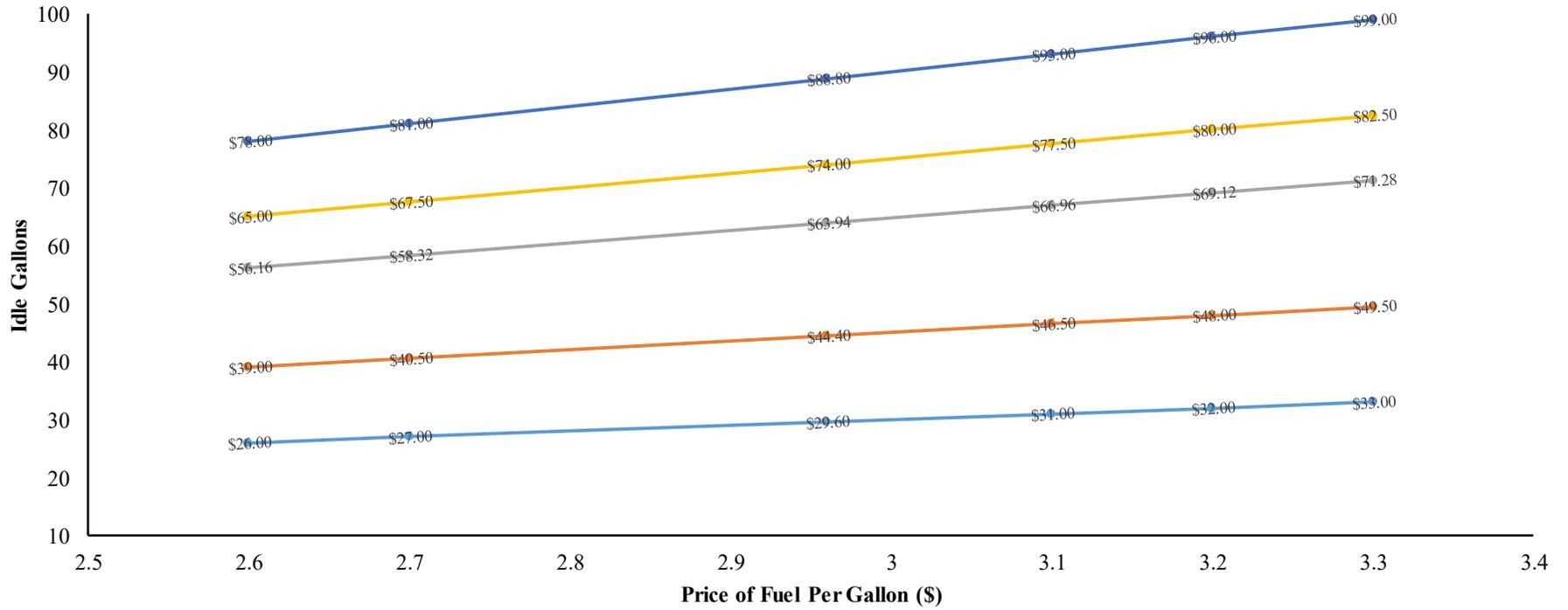
**Table 4.4: Fuel Sensitivity Analysis – For the Entire Month of January, 2022**

		<b>Idle Gallons</b>				
		<b>10</b>	<b>15</b>	<b>21.6</b>	<b>25</b>	<b>30</b>
<b>Price</b>	<b>\$2.60</b>	\$26.00	\$39.00	\$56.16	\$65.00	\$78.00
	<b>\$2.70</b>	\$27.00	\$40.50	\$58.32	\$67.50	\$81.00
	<b>\$2.96</b>	\$29.60	\$44.40	\$63.94	\$74.00	\$88.80
	<b>\$3.10</b>	\$31.00	\$46.50	\$66.96	\$77.50	\$93.00
	<b>\$3.20</b>	\$32.00	\$48.00	\$69.12	\$80.00	\$96.00
	<b>\$3.30</b>	\$33.00	\$49.50	\$71.28	\$82.50	\$99.00

Using the average results in Table 4.1 as the baseline, the average idle gallons and price per gallon are 21.6 gallons and \$2.96, respectively. With the sensitivity analysis, FCC can see how changes the fuel price and idle gallons consumed change the total cost spent. The more idle gallons consumed, the more FCC will spend during the six months of the harvest season. If it is better controlled and there are less gallons used, there are additional cost savings as a result. It is also easy to see that idle savings grows as fuel prices increase. The graph in Figure 4.1 illustrates the sensitivity analysis plotting the price of fuel per gallon against idle gallons consumed. As the price of fuel goes up (X axis), which is uncontrolled, it is inevitable that FCC will spend more money per gallon, but the way it is used can be controlled (Y axis) and Ford Pro Telematics can help pinpoint the higher idle vehicles (i.e. moving to lower curves on the graph by reducing vehicles idling). When higher idle vehicles are visible on the dashboard, it is easy for the manager to dive further

into the employees driving history to better understand the reasons for idling to better improve vehicle management.

**Figure 4.1 Sensitivity of Idle Gallons and Price**



As of March 2022, a subscription to Ford Pro Telematics was quoted to FCC at \$17 per month, per vehicle. The subscription does not require a contract for a year and can be paid for on a per month basis. Table 4.5 shows how many gallons from idle would need to be controlled for in order to offset the cost of Ford Pro Telematics for one truck for a month. Table 4.6 shows the same calculation for all 10 trucks for a harvest season (6 months). Based on data in Tables 4.1 and 4.2, FCC consumed, on average, 22.14 gallons at a price of \$2.96 per gallon, making the average cost of idling \$65.54 per month per truck. The cost of the subscription (\$17 per month) divided by the cost of fuel (\$2.96 per gallon) yields that 5.74 gallons would have to be controlled per truck per month in order to pay for the subscription. Table 4.6 takes it a step further to show that 344.59 gallons over all 10 trucks would have to be controlled per harvest season in order to pay for the subscription. Although this information provided enough to visualize where savings are, the demo did not provide enough benefit for the time period examined to cover this cost with an average savings of one gallon. Additional management will be needed to increase cost savings here to achieve the goal of paying for the subscription cost. Reducing idling time is likely the least costly option. Driving distances may likely be more uncertain year-to-year.

**Table 4.5: Off Setting The Price of Ford Pro Telematics (Per Month Per Truck During Harvest Season)**

Average Gallons Consumed Idling	22.14
Price Per Gallon	\$2.96
<b>Average Cost of Idling</b>	<b>\$65.54</b>
<b>Cost of Ford Pro Telematics Subscription</b>	<b>\$17.00</b>
<b>Fuel Savings Needed from Idling Reductions to Cover Subscription Costs (Gallons)</b>	<b>5.74</b>

**Table 4.6: Off Setting The Price of Ford Pro Telematics ((10) Trucks During (6) Month Harvest Season)**

Average Gallons Consumed Idling	1328.40
Price Per Gallon	\$2.96
Average Cost of Idling	\$3,932.10
<b>Cost of Ford Pro Telematics Subscription</b>	<b>\$1,020.00</b>
<b>Fuel Savings Needed from Idling Reductions to Cover Subscription Costs (Gallons)</b>	<b>344.59</b>

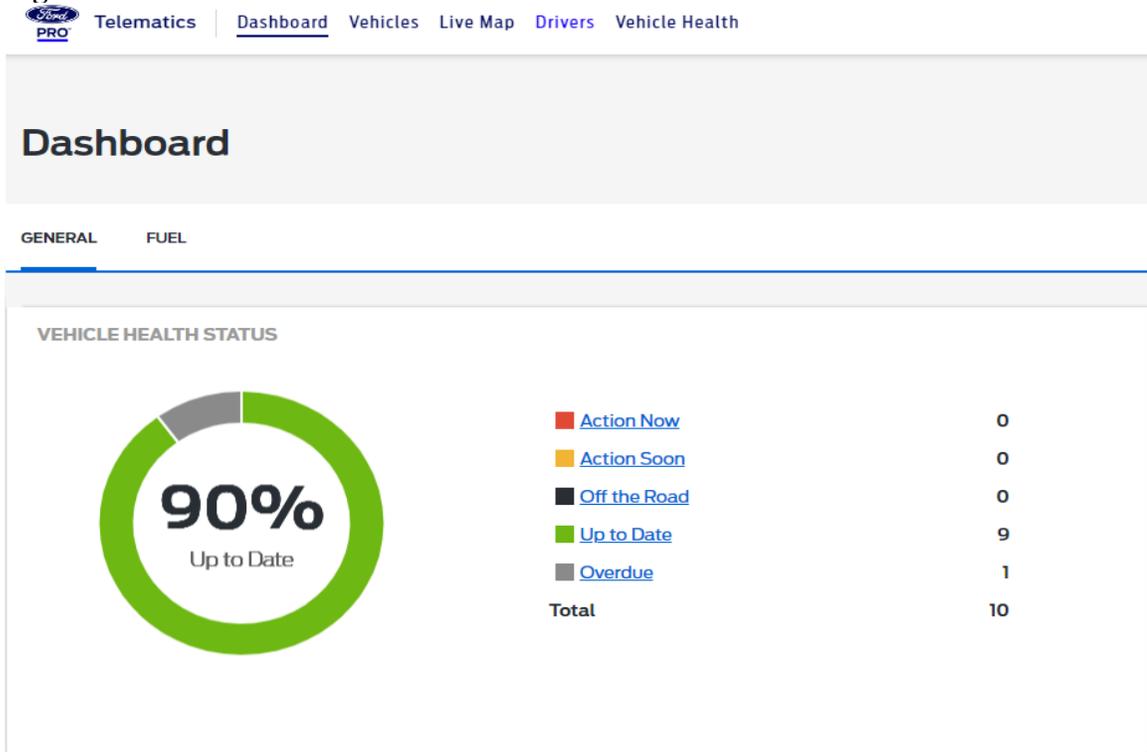
#### **4.2 Upkeep On Preventative Maintenance**

Implementing an organized and routine preventative maintenance plan is a critical piece for any fleet to ensure assets are operating to their full potential. A preventative maintenance program enhances the safety of employees that are operating these assets, reduces downtime, and can prevent high dollar repairs from unforeseen failures. According to Laura Flowers, content marketing specialist for Fleetio, a superior preventive maintenance schedule is one that is sustainable (Flowers 2019). Florida Crystals Corporation currently uses work orders through SAP SE and spreadsheets to manage much of their preventative maintenance schedules for vehicles. As Flowers describes, this process leads to inefficiency and can even cause some vehicles to miss their scheduled maintenance (Flowers 2019). The fact is, the larger the fleet, the more manual input there is to stay on top of work orders and schedules. When there is more manual input for these work orders, disorganization can and does happen. FCC has experienced this first hand with a 2018 F-150 XL Regular Cab model. Although the vehicle is not part of the Ford Pro Telematics demo, it was under the SAP SE preventative maintenance program and unfortunately, missed three oil changes because it fell off the radar of the preventative maintenance plans. To put it into perspective, the vehicle was purchased for \$32,588.31. Throughout its life with FCC, it saw approximately \$2,500 in costs which included tires, oil

changes, filters, and other preventative maintenance costs. The employee that was driving the vehicle reported a transmission knock to the service manager which launched the investigation at the repair shop. With limited tooling to investigate further, the vehicle was sent by tow truck to the local Ford dealership to continue the diagnosis. After further review, the dealership deemed that the transmission needed to be replaced, and it would cost FCC \$8,000 in repair costs to complete. This would bring the total cost of repairs to \$10,500, or 32% of the original purchase cost of the vehicle. Had this vehicle been subscribed to Ford Telematics, it would have sent preliminary notifications, warnings, and alerts to the fleet manager to prevent the failure before it happened.

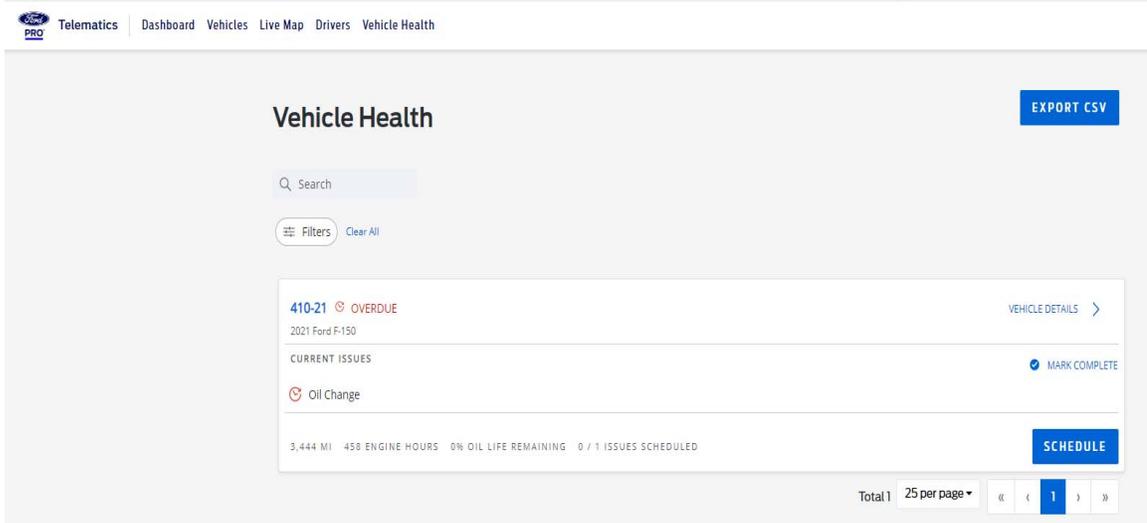
Vehicle health alerts are one of the many highlights that Ford Pro Telematics offers. From the moment a user is logged in, they can go to the dashboard to view the health status of the overall fleet. This can eliminate having to follow up with the work orders SAP SE generates through spreadsheets and be able to pinpoint vehicles that are in good standing, in need of preventative maintenance, or past due preventative maintenance, allowing corrective action to be taken as soon as possible on vehicles in need. As seen in Figure 4.2, the user is able to see that there are 9 vehicles up to date, and one that is overdue. For the one vehicle that is showing an overdue status, the user can see that there is a vehicle due for an oil change, (Figure 4.3). The user can also mark the oil change as complete when it is completed to clear the health status or schedule an oil change as needed.

**Figure 4.2 Ford Pro Telematics – Vehicle Health Status**



Source: Ford Pro Telematics 2022 (e)

**Figure 4.3 Ford Pro Telematics – Vehicle Health Status – Oil Change Needed**



Source: Ford Pro Telematics 2022 (e)

Having the ability to streamline the preventative maintenance schedules through the Ford Pro Telematics platform reduces the chance to miss maintenance like the 2018 F-150

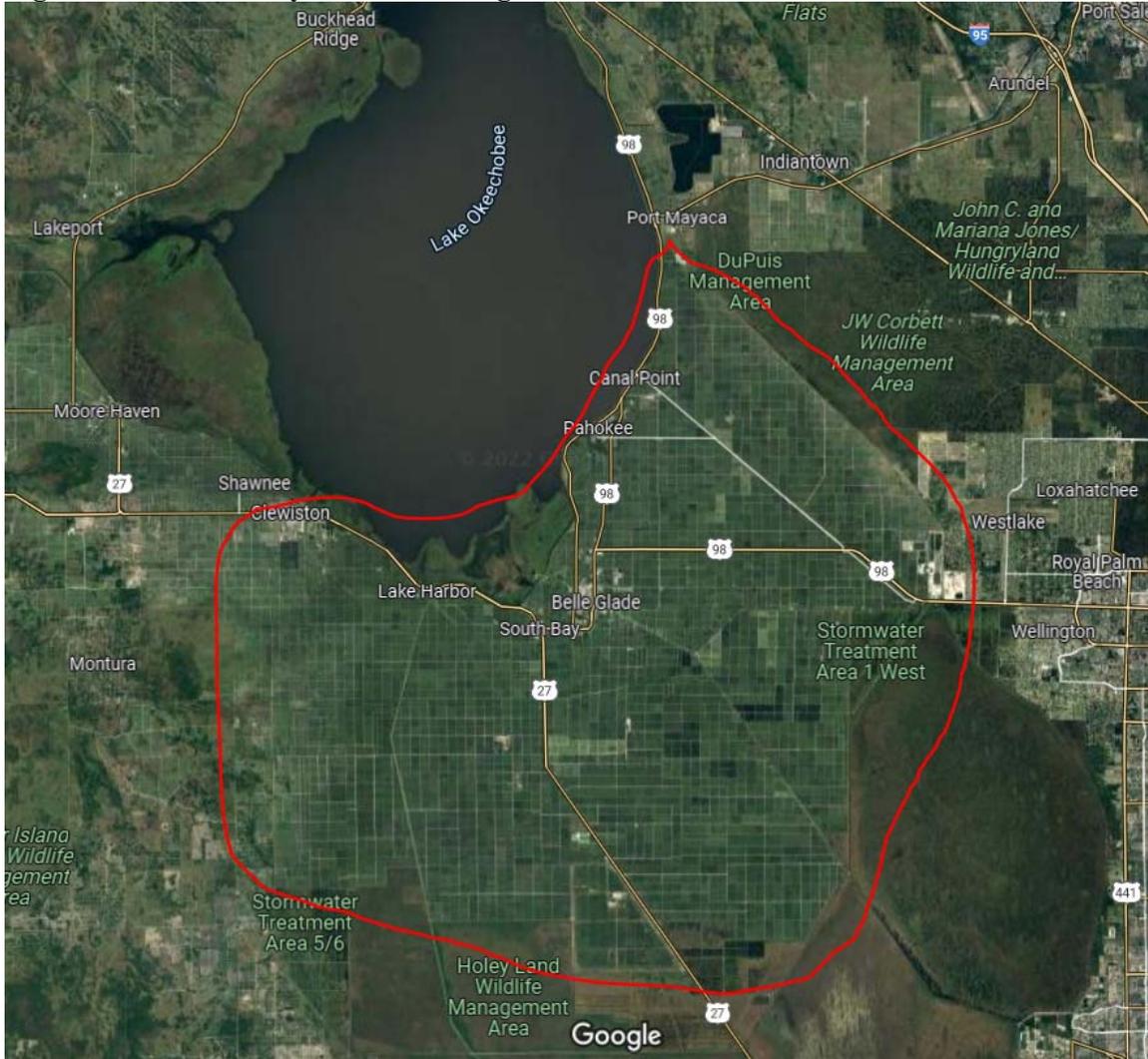
that experienced the high dollar transmission failure. As Fleetio's Laura Flowers mentions, leveraging fleet management through a software platform, can allow for managers to set service reminders, track and manage repairs, all through an organized system to ensure that vehicles are safe and road worthy (Flowers 2019). Another benefit to collecting data on the service intervals of a specific vehicle is that when it comes time to sell the asset, users can provide a history of preventative maintenance along with the sale of the vehicle.

### **4.3 Driver Location, Daily Routes, and Safety**

With the ability to monitor employee's locations, fleet managers can pinpoint where vehicles are at any given point in time, providing them with methods for optimally assigning laborers to tasks that need to be completed. For example, it can take upwards of six hours to get from one location of the farm to another because of the private, rough, off-road conditions. Florida Crystals Corporation's farms are scattered throughout The Everglades Agricultural area on the South East side of Lake Okeechobee, as seen in Figure 4.4. To ensure daily tasks are completed in a timely manner, being able to deploy the closest field laborer to complete a job can cut back on fuel usage and also reduce unnecessary mileage on a vehicle that may be further away, conserving oil changes and preventative maintenance intervals. According to Laura Fletcher, from Work Truck Online, "telematics sits at the heart of numerous daily routines and can aide in digital workflows that enhance efficiency" (Fletcher 2021). In the case of a vehicle breakdown, an employee may be able to notify their manager of the breakdown or provide a dropped pin from their smart phone, but many field laborers that work for FCC do not have smart phones, only a marine radio in their vehicle. Being able to provide their vehicle number to their manager

(who has a smart phone), can allow for that manager to contact the fleet manager and deploy a tow truck to the exact location provided by the telematics dashboard.

**Figure 4.4 Florida Crystals – Farming Area**



Source: Google 2022

Farming practices can change daily and being able to plan routes around yearly operations is an option that Ford Pro Telematics can provide. The GPS data that is being collected from each driver can provide fleet managers with driver start and stop times during their daily tasks. Due to the fact that farm directors and farm managers cannot be

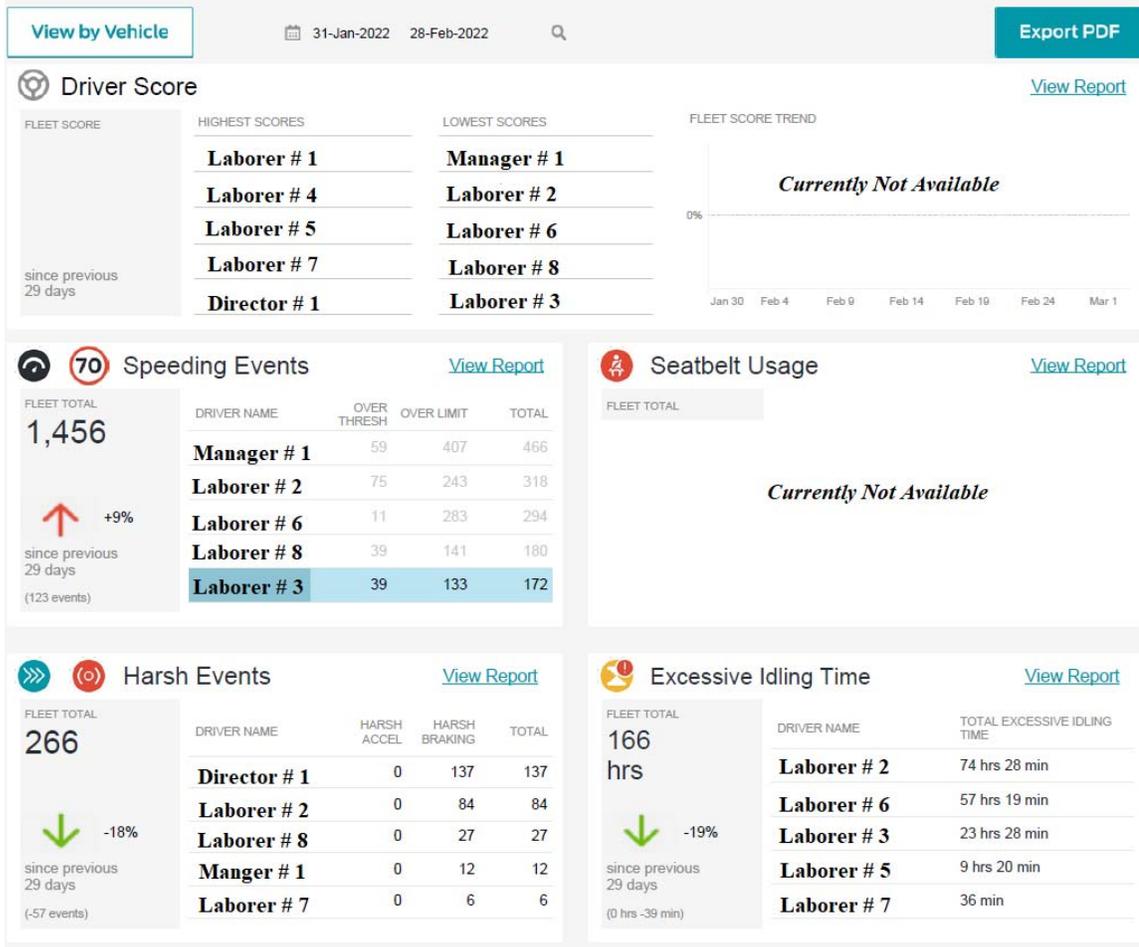
with each of their employees all day every day, the use of the system can help them to understand what their laborers were doing or where they went during the tasks they assigned them at the start of a work day. In other words, what you expect of them versus what actually happened. Of course, communication is key, but it comes down to trusting and verifying. Often times there will be alternate routes to be taken if there is an accident or construction, for example, but if a driver makes a habit of adding an extra 50-100 miles a week out of their normal planned route with the price of fuel at approximately \$2.96, that can easily add up.

Agriculture is one of the most dangerous industries in the modern world (Centers for Disease Control and Prevention 2022). The safety of all employees at FCC is a top priority for the company. Ford Pro Telematics provides a variety of notifications when a driver is not wearing their seatbelt, speeding over the posted speed limit, and/or has a hard braking or fast acceleration event (Figure 3.4). Although drivers are not perfect, and the aforementioned will inevitably occur from time to time, telematics can help monitor problematic drivers and allow management to take necessary action to address them before a more serious incident occurs. When a driver is not wearing their seatbelt, speeding over the posted speed limit, or has that hard braking or hard acceleration event, it is recorded and feeds into the driver's overall scorecard, Figure 4.5. A disclaimer for this thesis is that the Ford Pro Telematics driver scorecard is currently only provided as a beta test – some data is not yet available or incorporated into the scorecard. The scorecard will have to be reevaluated after the remaining features are updated and available. However, from meetings with Ford Pro Telematics engineers, the driver's score is based on positive driving habits. The higher the score, the better the driving habits, i.e., wearing their seatbelt

at all times, driving at the posted speed limit, normal braking and accelerating events, and even low idle times. The lower the score, the less beneficial driving habits are being observed.

The monthly results from the scorecard could provide trends on drivers' habits and illustrate who are the problematic drivers. Coaching sessions could be implemented to mitigate issues and improve their driving habits. The scorecard could also result in incentive programs such as a gift card to the highest scoring driver at the end of a monthly period or even the harvest season. The use of an incentive program could influence and engage employees to better their driving scores. Although there are many ways to incentivize, the cost of incentivizing would have to be taken into consideration as well as if it continues to offset the cost of a monthly subscription to Ford Pro Telematics. Incentives do not necessarily have to be monetary. For example, the Laborer F-150's are a base model with the bare minimum features inside and outside the truck. FCC could incentivize employees by adding power windows and locks for those drivers that score better or have improved over time. This would bring a sense of moral to that employee, and show that they are rewarded when they take care of a company asset, all while adding resale value to the truck when it meets its end of life with FCC. More research and investigation needs to be undertaken on the functionality and use of the scorecard option in the system before it would adopted for such programs and use.

Figure 4.5 Ford Pro Telematics – Driver Scorecard



Source: Ford Pro Telematics 2022 (f)

## CHAPTER V: CONCLUSION

Data is very important when it comes to decision making and implementing change. Without data, Florida Crystals Corporation is not able to benchmark and will have limited avenues for improvement. Data is important because it can inform FCC on what they can do to improve moving forward. It provides a window of what inefficiencies and weaknesses they may have in their current operations. Although there may be inefficiencies and weaknesses in that data, there are also areas that prove to be positive and can be used as a foundation to build off of. According to Martyn Etherington, a brand contributor at Teradata, “Data shines a light on what’s possible and has the power to make it a reality, if you use it the right way” (Etherington 2020). Technological breakthroughs and advances have made data collecting faster and easier than ever before. The team at FCC embraces the use of technology to continue on the path toward carbon neutrality being a sustainable operation and improving and optimizing fleet management.

This thesis provided an evaluation of a demo of telematics on FCC’s fleet vehicles through Ford Pro Telematics. Several points of data were collected from the Ford Pro Telematics systems (dashboards) and examined to see how it could help management make more informed decisions to optimize and make the fleet more efficient. Although this demo only focused on 10 out of the 500 vehicles in the FCC fleet, the demo provided quality information and data on how it can help improve the ways the fleet is currently managed. It also opened the door to understand areas that were previously overlooked or just not accessible without remote connectivity to a vehicle. Excessive idling, seat belts being worn, harsh braking or acceleration, trip history, to name a few, are all areas that FCC management were not able to see without being present with a driver. These areas have

shown that there is a possibility for savings in fuel and a way to coach and promote a safer environment.

## **5.1 Summary**

The overall purpose of this thesis was to examine the adoption of telematics on fleet vehicles for maximum optimization. Through a demo with Ford Pro Telematics, Florida Crystals Corporation was able to see how a telematics program could enhance fleet operation. Ten vehicles and drivers were involved in the demo, which was approved through FCC's human resources department, and provided FCC with enough data to consider implementing changes and improvements to the fleet. The idea was to understand if Ford Pro Telematics would be worth implementing on the entire fleet to improve vehicle and driver performance to ultimately yield a safer environment for FCC's employees and ensure that they are optimizing their fleet and vehicle performance.

The areas of focus for the study were fuel usage (driving and gallons consumed during idling), vehicle utilization (a road map of a driver's day to day operation), areas of safety (seat belt usage and obeying speed limits), and vehicle health (oil changes and preventative maintenance). A sensitivity analysis for fuel usage was performed using the data from Ford Pro Telematics from January 2022 to show that there is potential for cutting down on wasted fuel use due to excessive idling. Vehicle utilization was examined to determine how and where the vehicles were being operated, and informed FCC that they could potentially set routes or deploy vehicles where needed depending on a specific job that needed to be done, helping to further reduce costs. Ensuring that if a vehicle was closer to a jobsite than another vehicle, the closer one would be deployed to optimize completion of that task. Safety was also examined to provide management with information of what

employees were doing when operating a vehicle. From wearing their seatbelt to obeying the posted speed limit. And finally, Ford Pro Telematics showed FCC that vehicle health and maintenance could be monitored to ensure each vehicle was up to date on oil changes and preventative maintenance to prevent and minimize failures and downtime.

## **5.2 Take-Aways, Limitations, and Future Work**

The results of the demo provided several areas of consideration. Fuel savings from cutting down idle gallons consumed per vehicle could be a primary contributor to paying for the subscription for Ford Pro Telematics. A subscription to Ford Pro Telematics is \$17 per vehicle, per month. At the moment, it does not require a contract subscription so it can be adjusted on a month-to-month basis. Averaging the data from Tables 4.1 and 4.2 together, Table 4.5 showed that Florida Crystals Corporation consumed 22.14 gallons at a price of \$2.96 per gallon and the average cost of idle was \$65.54 for the month per truck. The cost of the subscription (\$17 per month) divided by the cost of fuel (\$2.96 per gallon) yielded that 5.74 gallons would have to be controlled per truck per month in order to pay for the subscription. Table 4.6 showed that 344.59 gallons among 10 trucks would have to be controlled per harvest season in order to pay for the subscription.

Although FCC previously knew vehicles were idling, they did not know how much fuel was used and the associated cost. Ford Pro Telematics opened the door to better understand it. Agriculture operations change daily, so it is recognized that utilization of vehicles will also change. Being able to optimize and deploy vehicles where needed will reduce unnecessary trips which can cut back on additional mileage and wear on the fleet. Overall, reducing idling time will have a positive impact on environmental and social governance as FCC continues on their path to reduce their carbon footprint.

Safety across the organization is important. Ensuring that FCC employees are practicing safe driving habits while operating a company vehicle are crucial because FCC cannot be with every employee every day. It is important that they can monitor safe driving on a platform such as Ford Pro Telematics. As with all company assets, maintenance and vehicle health are imperative to keep us moving. Without proper upkeep FCC would experience unnecessary downtime. Ford Pro Telematics provides the proper tools to monitor health and preventative maintenance intervals. The implementation of Ford Pro Telematics would also reduce the administration time spent pulling individual reports from SAP SE, which are cumbersome and often subject to human error. Depending on the report needed, Ford Pro Telematics could offset three or four hours' worth of work from the reports available in SAP SE.

Although FCC is primarily self-insured as it relates to vehicle insurance, having a system like Ford Pro Telematics may help reduce the premium for that self-insurance program. Many insurance companies recognize that drivers tend to be more conscious of their habits when they are being tracked (Gale 2021). A system like Ford Pro Telematics may discourage employees from using the vehicle outside of normal use, reducing the chances of an accident or insurance related matter.

Unfortunately, there are some limitations with the Ford Pro Telematics Demo and the analysis conducted here. The short time period of the demo did not allow for an entire year's or growing season's worth of data for comparison. The benchmarking for the sensitivity analysis was done using previous year's data through the SAP SE system that FCC is currently using. Also, because Ford Pro Telematics is still a relatively new platform, beta testing is still being completed on some key features, such as the driver's

scorecard section. The demo only allowed for 10 vehicles in an overall fleet of 500 vehicles. A small sample can often make it difficult to obtain a complete picture. It would be interesting to see how different the entire fleet looks on the Ford Pro Telematics platform if it was fully adopted.

In order to move forward and take the demo to a full subscription, FCC needs to take a few things into consideration. First, use this demo as an experience to lay out what subscription would make most sense for the fleet. Some subscriptions can be customized to the needs of the subscriber, which can change the price of the subscription plan. Next, collecting a year's worth of data to compare and contrast drivers throughout the fleet. Then, put a plan in place on how to create change in order to optimize and make the fleet more efficient. FCC will need to address problematic drivers in a way that doesn't affect morale amongst the employees. Incentive plans could be implemented for high scoring drivers, or drivers that have improved throughout the year or after coaching sessions. Finally, FCC needs to understand that technology is going to continue to advance and improve. It is imperative to keep up with the technological advances in telematics to ensure that they are getting the most out of their investment.

If Ford Pro Telematics is implemented on FCC's fleet, the expectation is that the overall fleet performance will improve. FCC has a strong history of innovation and advances throughout their sixty years in South Florida. Telematics on the fleet would continue these innovations and advances and compliment the sustainability footprint that they are aiming for.

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## **APPENDIX**

### **About The Author**

Although I did not grow up with a direct relationship to agriculture, I have always had an interest in mechanically operated equipment. Whether it is a large excavator or tractor, ATV, or on-road vehicle I have always enjoyed learning about it. From a young age, I have had the opportunity to work on and operate many pieces of equipment and machinery. This sparked my initial interest in going to school for my B.S. in Agricultural Systems Management and obtaining a Minor in Off-Road Equipment and Heavy Machinery. That being said, I know how expensive it is to purchase and repair new and old equipment which makes me respect and take care of equipment I own, as well as what I manage and oversee for Florida Crystals Corporation. I know that over the last six years with FCC, I have added value to their operation and I would like to continue to do that by utilizing my expertise and ability to engage in learning about new technologies to help make life easier when it comes to managing the fleet.