Public Comment
Dry Year Report
Deadline: 10/15/14 by 12:00 noon

Trimble Navigation Limited
935 Stewart Drive
Sunnyvale, California 94085

RECEIVED
10-15-14
SWRCB Clerk

October 15, 2014

State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100
Attention: Jeanine Townsend, Clerk to the Board

Re: Dry Year Report Comments

Dear Ms. Townsend:

The Agriculture Division of Trimble Navigation Limited, a California corporation ("Trimble"), is providing comments in regards to recommendations for improvements to the implementation and enforcement of water rights during drought conditions in the State of California. Trimble believes that its broad offerings of precision agriculture solutions can help address California's water crisis that will not only benefit the individual farmer, but also the State.

Trimble Agriculture solutions enable customers to maximize efficiency and reduce inputs while also protecting natural resources and the environment. Trimble's precision agriculture solutions cover all seasons, crops, terrains, and farm sizes, and its brand-agnostic strategy allows farmers to use Trimble products on most equipment—regardless of manufacturer.

One main objective of Trimble's Agriculture Division is to provide farmers with a complete suite of solutions to design and automate the entire farm water ecosystem. This objective not only impacts how farmers utilize water, but also how they manage their land, soil, and inputs. To help achieve this, Trimble offers solutions to help farmers apply the right amount of water, fertilizer, or chemicals in the right place at the right time, while also providing data to help farmers make informed decisions year after year.

Such solutions that contribute to entire farm management include land leveling, drainage, and irrigation solutions that enable farmers to optimize water distribution; soil information systems that help farmers understand their soil properties for better input management; and the Connected Farm™ solution that allows farmers to collect, share, and manage information across their farm in real time.

Soil Information

The Trimble® Soil Information System™ ("SIS") solution is an industry-leading soil mapping technology that uses advanced sensors and intelligent targeting and geo-processing algorithms to produce high-resolution, accurate soil and topographic information. SIS identifies the individual patterns that exist for each soil property, such as plant available water, salt concentration levels, nutrient holding capacity, compaction, root zone depth, etc.

In comparison to EC/EM maps which are based only on the conductivity of the soil, SIS maps are created from a combination of EM mapping, physical soil samples, and proprietary data processing to create 3D maps of many individual soil properties—all of which vary independently from one another at a given location.

One of the soil properties produced by SIS is called plant available water ("PAW"). This is the amount of water that the soil can hold and is available for the plant's growth and development. PAW is dependent on a variety of soil properties including soil density, texture, structure, organic matter, chemical properties, thickness, and orientation of these properties, and thus varies across the field.

The PAW values can help farmers determine irrigation maps based on zones of similar PAW values. These irrigation zones can be utilized by variable rate irrigation systems to apply the right amount of water in the right place—resulting in efficient water use based on the soil and crop requirements.

Irrigation

The Trimble® Irrigate-IQ™ precision irrigation solution is a GPS-controlled irrigation hardware and software solution that enables farmers to control pivot irrigators, create irrigation watering plans, perform variable rate irrigation, and receive reports.

The Irrigate-IQ solution's variable rate irrigation utilizes individual nozzle control to maintain the spatial accuracy of the watering plan. Each nozzle is controlled independently from one another, and its flow rate varies based on the watering plan and location. If the flow rate on the nozzle reaches its maximum and more water is required, the pivot will slow down and each nozzle along the pivot will adjust to accommodate the amount of water needed at that specific location. Traditional zone or speed controlled variable rate irrigation systems do not provide this high level of targeting and accuracy in comparison.

A watering plan serves as the basis for variable rate irrigation within the Irrigate-IQ solution. It can be as simple as excluding areas that don't need water such as roads and other fixed landmarks, or as complex as defined by the SIS irrigation zone map. Targeted water application that is modeled from soil properties can help ensure that the optimal amount of water is getting to the root zone for plant uptake. This results in more efficient use of water, while contributing to increased yield and improved quality.

For farmers who have strict water allocations, irrigation zone maps that are produced from SIS data can help them make informed decisions on their farm. For example, they may want to grow a more water-efficient crop in a certain area or even take that area out of production. The purpose of SIS and its integration with the Irrigate-IQ solution is to ensure water is being used efficiently, and not being wasted.

Connected Farm

To address the topic of management of farm data, Trimble has developed the Connected Farm solution, which enables farmers to efficiently manage the large amount of data their farm applications are recording. The solution provides wireless data transfer between the farm and the office or between vehicles.

Much of this data can be viewed online on a customizable dashboard that the provides a centralized snapshot of farm operations, like irrigation monitoring, as well as key information impacting farm

decisions such as weather, rainfall totals, commodity prices, etc. This information is valuable to farmers in making decisions about their day-to-day farming activities.

The solutions outlined above represent a small portion of Trimble's whole farm solutions. Trimble also offers solutions for effective nutrient and pest management as well as means to quickly evaluate crop health. Its entire portfolio of products is attached.

The current situation in California requires such technology and data to effectively and optimally manage its water resources for agriculture. As more farmers have access to these tools, the better they can prepare and manage their farms during dry periods. It is my hope that the State of California will consider Trimble in its efforts to conserve water across the state.

Thank you for the opportunity for Trimble to provide comments on this public issue. I would like to offer the opportunity to present Trimble's suite of farm management solutions at your convenience.

Sincerely,

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Trimble Agriculture Division
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Attachments:
2014 Trimble Agriculture Product Portfolio

2014 Trimble Agriculture

Trimble GPS, guidance, and precision agriculture solutions for all seasons, crops, terrains, and vehicles

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Trimble

Making a Difference for Farmers Worldwide

At Trimble we understand the importance of maximizing efficiency on the farm, operating more profitably, and protecting the environment and our natural resources. We also understand the pressure farmers worldwide are facing to produce more with less. That's where Trimble® precision agriculture products help. With solutions for all seasons, crops, terrains, and vehicles, we're working hard to help farmers succeed.

COMMITTED TO YOUR SUCCESS

Trimble solutions can make a difference in how a farmer runs his operation. Whether it's Trimble's guidance and steering solutions that enable a farmer to continue field operations well into the night, or our variable rate application, section control, and advanced seed monitoring system that helps farmers increase yields and save on input costs. Maybe it's our GreenSeeker® crop sensing system that transforms a farmer's nitrogen applications by allowing him to apply the right amount, in the right place, at the right time, to give the plant exactly what it needs to thrive. Or our portfolio of correction options, which are the most versatile and accurate of their kind in the industry, enabling farmers to increase productivity by maximizing the use of their available land. Plus, our brand agnostic strategy allows farmers to use Trimble products on almost any vehicle—regardless of the brand.

WHERE ARE WE HEADED?

Natural resource conservation is becoming an increasingly important issue. As the world's growing population requires more water, and regulations around its usage increase, farmers are looking for ways to optimize their water use. To help achieve this, Trimble offers land leveling, drainage, and now an irrigation solution that provides remote control of irrigation activities down to the individual nozzle.

Another hot topic in agriculture is the management of farm data: how to send it, store it, and ultimately use it. To help farmers more efficiently manage the large amount of data their precision agriculture applications are recording, Trimble's Connected Farm™ solution provides wireless data transfer between the farm and office or between vehicles operating in the same field—saving time and increasing efficiency.

The Connected Farm solution also provides farmers with the data they need to make better decisions about their farm. For example, Connected Farm includes a customizable dashboard view that provides a centralized snapshot of farm operations as well as key information impacting farm decisions such as weather, rainfall totals, commodity prices, fleet details, and more. With this information at their fingertips, farmers can make more informed decisions about their daily farming activities.

Joe Denniston
Vice President, Trimble Agriculture

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Connect Your Farm

Connect Your Farm

When data is connected between the field, fleet, and office, you can quickly and easily enhance your everyday planning, decision making, and overall strategy for your operation. Bring everything together with the Connected Farm™ solution and revolutionize the way you farm.

SELECT A CORRECTION SERVICE

You'd never settle for just good enough. Trimble's correction services get you close to perfect by maximizing every pass and increasing your efficiency. Select the right correction service option based on your crop, terrain, and location—and improve your bottom line.

CHOOSE A GUIDANCE DISPLAY

Take control of your entire operation by choosing an in-cab guidance display based on your farming application and business requirements. With an array of functionalities and price points, you can select a display option that best fits your farming needs, and allows you to expand as your business grows.

ADD A STEERING SYSTEM

Keep your vehicle on line and focus on other farming tasks by using one of Trimble's assisted or automated steering systems. With their terrain compensation functionality, you can easily operate in difficult terrain conditions while minimizing skips and overlaps to help improve yield.

WATER SOLUTIONS

Choose from a variety of products based on your irrigation or drainage needs. Trimble's water solutions allow you to minimize water costs and efficiently distribute water—helping you see improvements in yields, water usage, and farm productivity.

FLOW AND APPLICATION CONTROL

From flow/seed control valves and spot spray products to a full solution that performs variable rate application and automatic section control, Trimble's flow and application control systems can help you increase yields and save on input costs for seed, granular fertilizer, liquid, or anhydrous ammonia.

HARVEST

Leverage Trimble's proven technologies and tools in your harvest operations to produce accurate yield data. This data supports critical decisions throughout the entire crop cycle—ultimately leading to improved yields, lower input costs, and increased profitability.

LINK IT ALL TOGETHER WITH CONNECTED FARM

Accessing valuable data generated by Trimble's precision ag hardware is easier with Connected Farm due to wireless data transfer between the field and farm office, and between vehicles in the same field. Connected Farm also allows you to monitor your farm's vehicle fleet to make faster decisions about field activities and vehicle maintenance.

WHAT CAN YOU DO WITH THE DATA?

Utilize your data to make timely decisions on fertilizer recommendations, seed variety selection, water usage, fleet logistics, and more. Connecting your data allows you to analyze profit maps that pinpoint the profitability for each part of the field—showing you valuable information on what is working and what is not. No other solution provides more information at your fingertips than Connected Farm.

CORRECTION SERVICES

- Benefit from Trimble's 30+ year history in the GPS industry
- Get unmatched accuracy, reliability and uptime
- Choose the accuracy you need for your farming applications
- Receive accurate, high-performance positioning no matter where you are located
- Achieve substantial yield benefits for all crop types

Correction Services

Trimble has been the leader in the GPS industry for over 30 years. Our correction services are second-to-none, and are the backbone of every precision agriculture solution we offer. Substantial increases in yield can be achieved by using any level of correction, from sub-meter to sub-inch. No matter where you are located or the size of your operation, Trimble has a correction service solution for your farm.

RTK-Based Technology

CENTERPOINT RTK

Accuracy	Initialization/Convergence
< 1" (2.5 cm)	< 1 min

Receive the highest accuracy correction service within 8 miles (12.87 km) of an established RTK base station or base station network. Contact your local Trimble Reseller to determine if your area has RTK base station coverage.

Add a Trimble® RTK base station as part of a network or as a single mobile base station for on-farm use.

TRIMBLE xFILL TECHNOLOGY

- Increase your uptime by receiving supplemental xFill™ signals when an RTK signal is lost
- Maximize your productivity by continuing your farming operations until your RTK signal is restored
- Benefit from uninterrupted workflow with the seamless transition between RTK and xFill signals

*Receiver convergence time varies based on GNSS constellation health, level of multipath, and proximity to obstructions such as large trees and buildings. In ideal conditions, receivers can converge to a 30 cm position in approximately 10 minutes, 20 cm in 15 minutes, and full accuracy in less than 30 minutes.

All accuracies are horizontal.

RTX-Based Correction Services

Trimble delivers GNSS enabled, RTX-based corrections to your receiver anywhere in the world. Trimble CenterPoint™ RTX™ and RangePoint™ RTX correction services provide:

- Unmatched reliability and uptime
- Free GLONASS unlock with active subscription
- No base station needed
- Service over a large geographic area
- GNSS compatibility using the TMX-2050™ display, FmX® integrated display, CFX-750™ display, and AG-372 GNSS receiver

CENTERPOINT RTX

Pass-to-Pass Accuracy
< 1.5" (3.8 cm)
Repeatable Accuracy
< 1.5" (3.8 cm)

Initialization/Convergence
Standard* (with the exception of a small portion of the US that receives <1 min response)

RANGEPOINT RTX

Pass-to-Pass Accuracy
< 6" (15 cm)
Repeatable Accuracy
< 20" (50 cm)

Initialization/Convergence
1–5 min

Free! One-year trial of RangePoint RTX service available with the purchase of any new compatible product.**

**Valid in 2014. Other restrictions may apply.

Correction Services

Other Correction Services

CENTERPOINT™ VRS™

Accuracy
< 1" (2.5 cm)
Initialization/Convergence
< 1 min

OMNISTAR® HP

Accuracy
2–4" (5–10 cm)
Initialization/Convergence
Standard*

OMNISTAR XP

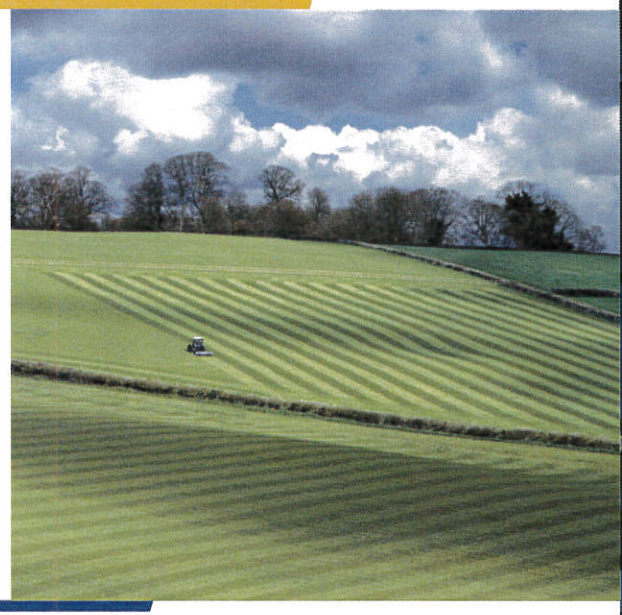
Accuracy
3–4" (8–10 cm)
Initialization/Convergence
Standard*

OMNISTAR G2

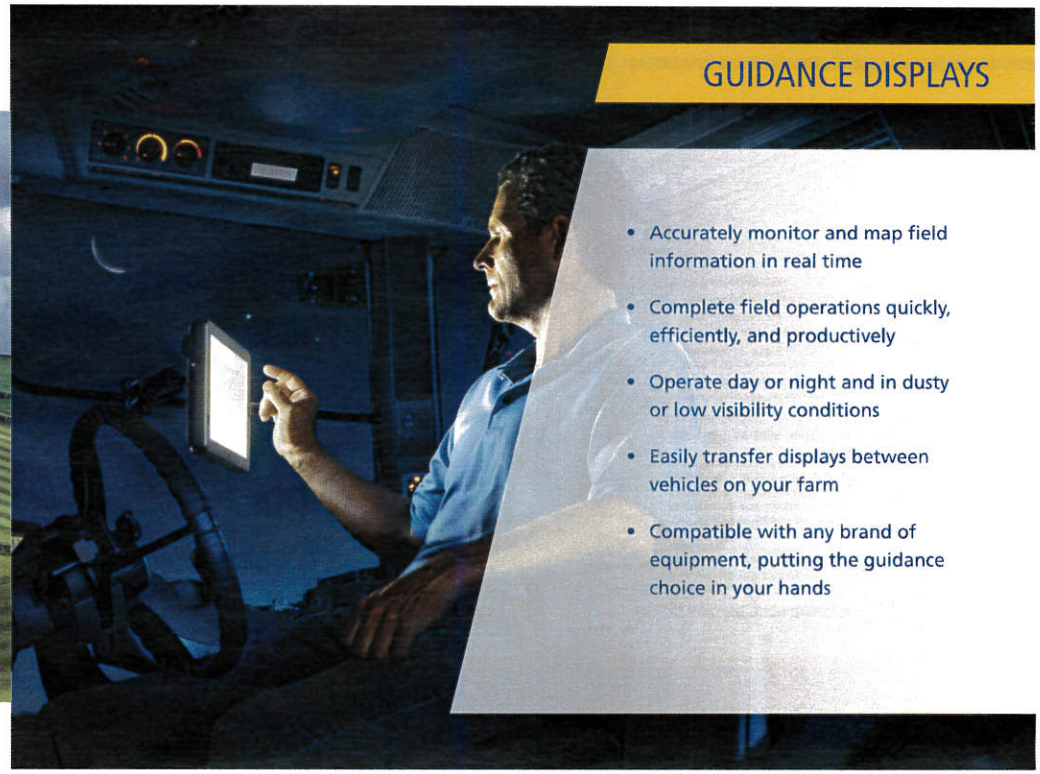
Accuracy
3–4" (8–10 cm)
Initialization/Convergence
Standard*

OMNISTAR VBS

Accuracy
6–8" (15–20 cm)
Initialization/Convergence
< 1 min



GUIDANCE DISPLAYS



- Accurately monitor and map field information in real time
- Complete field operations quickly, efficiently, and productively
- Operate day or night and in dusty or low visibility conditions
- Easily transfer displays between vehicles on your farm
- Compatible with any brand of equipment, putting the guidance choice in your hands

TMX-2050 Display

In the middle of a busy season, the last thing you need is a complicated interface. The rugged TMX-2050™ display has a large 12.1" (30.8 cm) high-definition touch screen with sharp visuals and a bigger, clearer image.

Built on the Android™ operating system, the flexible platform integrates into your operation seamlessly, and the intuitive interface makes it easy for both beginning and advanced users to easily implement precision agriculture solutions.

TECHNICAL OVERVIEW

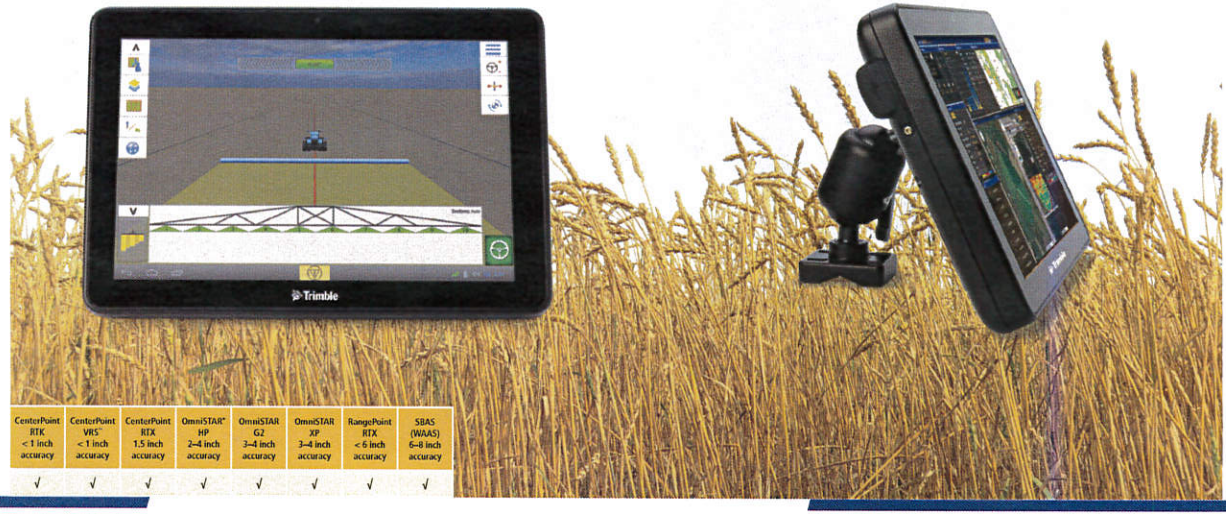
- Tablet-like interface with customizable run screen, allowing users to move and turn widgets on/off to meet their needs
- Rugged construction for everyday field use
- Easily transferred between vehicles

ADVANCED PRECISION AGRICULTURE CAPABILITIES

- Manual guidance and mapping
- Trimble® steering system compatibility
- Boom height control for sprayers
- Automatic section control for sprayers
- Single product variable rate application control for sprayers
- Wireless field to office data exchange
- Remote Assistant compatibility

GPS/GNSS CORRECTION ACCURACY MATTERS

High performance correction services, such as Trimble's CenterPoint™ RTX™ and RangePoint™ RTX, provide substantial performance benefits for your guidance display—increasing your field operation accuracy, yield, and profits.



CenterPoint RTK < 1 inch accuracy	CenterPoint VRS™ < 1 inch accuracy	CenterPoint RTX 1.5 inch accuracy	OmniSTAR® HP 2–4 inch accuracy	OmniSTAR G2 3–4 inch accuracy	OmniSTAR XP 3–4 inch accuracy	RangePoint RTX < 6 inch accuracy	SBAS (WAAS) 6–8 inch accuracy
√	√	√	√	√	√	√	√

TMX-2050 Display

BEYOND PRECISION TO DECISION

The newest innovation in Trimble's line of industry-leading guidance products—the TMX-2050 display—moves beyond precision agriculture functionality to provide vehicle operators with real-time decision-making capabilities.

The TMX-2050 display provides instant access to the Connected Farm™ dashboard—a central location to view the information that impacts a farmer. Using the Connected Farm dashboard, the TMX-2050 display provides real-time data, so operators can optimize performance and guarantee equipment security.

USE THE TMX-2050 DISPLAY AND CONNECTED FARM DASHBOARD TO:

- View local weather forecasts and recent rainfall totals for your fields so that you know whether to irrigate, or perform certain field activities
- Monitor vehicles in your farm's fleet to assess fuel levels, oil pressure, battery life and other diagnostics
- Locate other vehicle operators and view if they are idling, working, or traveling between jobs
- View field operation maps as they are completed in the field
- Check commodity prices

FmX Integrated Display

The FmX® integrated display is an advanced, full-featured guidance display for all your precision farming operations. This versatile display allows you to adapt as your farming business grows. It provides leading-edge capabilities that help you enhance your productivity in any stage of the crop cycle—season to season, year after year.

ADVANCED PRECISION AGRICULTURE CAPABILITIES

- Manual guidance and mapping
- Trimble® steering system compatibility
- Implement control
- Row guidance
- Spinner speed control for spreaders
- Advanced seed monitoring
- Six-product variable rate application control
- Automatic section control
- Nitrogen sensing in real time
- Land leveling and levee installation
- Drainage operations
- Yield monitoring
- Wireless vehicle to vehicle data exchange
- Wireless office to field data exchange
- Remote Assistant compatibility

PRECISE FARMING—NO MATTER WHERE YOU OPERATE

The FmX integrated display is compatible with a wide variety of correction services—ideal for any location, crop type, field shape, or soil type.

CenterPoint™ RTK < 1 inch accuracy	CenterPoint VRS™ < 1 inch accuracy	CenterPoint RTX™ 1.5 inch accuracy	OmniSTAR HP 2–4 inch accuracy	OmniSTAR G2 3–4 inch accuracy	OmniSTAR XP 3–4 inch accuracy	RangePoint™ RTX < 6 inch accuracy	OmniSTAR VBS 6–8 inch accuracy	SBAS (WAAS) 6–8 inch accuracy
√	√	√	√	√	√	√	√	√

CFX-750 Display

CenterPoint RTK < 1 inch accuracy	CenterPoint VRS < 1 inch accuracy	CenterPoint RTX 1.5 inch accuracy	OmniSTAR HP 2–4 inch accuracy	OmniSTAR G2 3–4 inch accuracy	OmniSTAR XP 3–4 inch accuracy	RangePoint RTX < 6 inch accuracy	OmniSTAR VBS 6–8 inch accuracy	SBAS (WAAS) 6–8 inch accuracy
√	√	√	√	√	√	√	√	√

The CFX-750™ display is an affordable, multi-function guidance display offering key precision agriculture functionality. This intuitive display allows you to easily perform day-to-day farming tasks, extend your operating hours, and enhance productivity on your farm.

KEY PRECISION AGRICULTURE CAPABILITIES

- Manual guidance and mapping
- Trimble steering system compatibility
- Boom height control for sprayers
- Seed monitoring
- Two-product variable rate application control
- Automatic section control
- Basic yield monitoring
- Wireless office to field data exchange

PROVIDING THE ACCURACY YOU NEED

No matter your location, crop type, field shape, or soil type, Trimble delivers a variety of correction service options to your CFX-750 display.

EZ-Guide 250 System

The EZ-Guide® 250 system provides high-quality, entry-level guidance capabilities at an entry-level price. It is well-suited for broadacre crop applications that can be accomplished with submeter accuracy. Use it for basic guidance to make your farming operations easier in any farming season.

KEY PRECISION AGRICULTURE CAPABILITIES

- Manual guidance and mapping
- Trimble® EZ-Steer® steering system compatibility
- USB data transfer for in-office analysis

SIMPLE INSTALLATION AND EASE OF USE

With its color display, one-touch function buttons, and intuitive interface, the EZ-Guide 250 system allows you to quickly access guidance lines and coverage maps and easily perform your day-to-day farming tasks.

BASIC SATELLITE COVERAGE AND ACCURACY LEVELS

The EZ-Guide 250 system is compatible with the GPS satellite constellation. Get submeter pass-to-pass accuracy with SBAS for farming applications that can be accomplished with lower-accuracy corrections.

SBAS (WAAS) 6-8 inch accuracy

STEERING SYSTEMS

- Keep your vehicle on line even while driving on difficult terrain
- Minimize skips and overlaps between passes
- Reduce crop damage and compaction to help improve yields
- Provides hands-free vehicle operation so you can focus on your farming tasks
- Reduce operator fatigue by automating steering

Autopilot, EZ-Pilot, & EZ-Steer Steering Systems

Autopilot Automated Steering System

The Autopilot™ automated steering system provides integrated, high-accuracy steering in any field type—hands free. When your vehicle is off line, the Autopilot system signals it to adjust its position to follow the correct path. The Autopilot system automatically steers your vehicle on line for maximum precision and increased productivity when performing the most demanding row crop farming applications.

EZ-Pilot Assisted Steering System

The EZ-Pilot® assisted steering system provides high-accuracy steering at an affordable price. When you are driving your vehicle, the EZ-Pilot system turns the wheel for you with a compact electric motor drive using guidance from Trimble® displays to help keep you on line and improve your efficiency. This versatile steering system is ideal for both low-accuracy broadacre farming applications as well as high-accuracy row crop applications.

EZ-Steer Assisted Steering System

The EZ-Steer® assisted steering system provides simple, portable, hands-free farming for more than 1200 vehicle models—old and new. The EZ-Steer system turns the steering wheel for you by combining a friction wheel and a motor with guidance from any Trimble display. It helps keep your vehicle on line for efficient, low-stress steering capabilities for your farming applications.

TrueTracker and TrueGuide Systems

To increase your planting accuracy, add one of Trimble's implement control solutions when using the FmX® integrated display. Implement control helps you guide your implement on line, so you can operate with ease.

Benefit by using an implement control system to accurately guide your implement on hillsides, rolling terrain, contours, or terraces in variable soil conditions; minimize the effects of draft; increase precision with seed and fertilizer placement; and maintain consistent guess rows.

TrueTracker Implement Steering System

The TrueTracker™ system is an active implement guidance system that keeps your tractor and implement on the same guidance line.

- Enables both the implement and tractor to stay on a repeatable path
- Reduces crop damage and compaction
- Provides high-accuracy control on difficult terrain with terrain compensation technology on the implement
- Best-suited for row crop and multiple-pass farming applications

TrueGuide Implement Guidance System

The TrueGuide™ system is a passive implement guidance system that monitors and corrects the position of your implement by moving the tractor.

- Low-cost solution requiring only a single additional antenna for the implement
- Best-suited for broadacre farming applications
- Ideal for controlling implements where multi-pass repeatability is not required

WATER SOLUTIONS

- Conserve water resources by increasing water use efficiency
- Make every drop count by responsibly utilizing nature's most precious resource
- Apply the right amount of water where the crop needs it to improve quality and yield
- Optimize the farm surface in preparation for optimal water application
- Benefit from our 30+ years of water management experience

Irrigate-IQ Solution

With the Irrigate-IQ™ precision irrigation solution, you can precisely apply the right amount of water, fertigation, or effluent in the right place to ensure you're doing what's best for your crop, while minimizing nutrient and chemical run-off.

Use the Irrigate-IQ solution to control pivot and linear irrigators and pumps, perform variable rate irrigation, and receive reports about where water or fertilizer was applied.

MONITOR

Monitor the direction, speed, and spray rate of your irrigation system and view reports to ensure optimal application.

CONTROL

Control your irrigation system from any computer, smart phone, or tablet—so you don't have to waste time going out to the field.

PLAN

Create, manage, and upload variable rate irrigation plans and exclusion zones to optimize your water usage and maximize crop potential.

APPLY

Perform targeted application of water, fertigation, or effluent based on your irrigation plan—and get water to where it matters most.

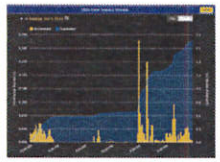
COMPLY

Safely dispose of effluent through your irrigation system to ensure even application and reduce the risk of leaching—while gaining natural nutrients from the effluent.

RainWave Solution & WM-Topo Survey System

RainWave Precipitation Monitoring Solution

The RainWave® precipitation monitoring solution provides you with vital rainfall data, allowing you to make better management decisions for irrigation planning, fleet management, and timing of material application for nutrient and pest management.



TRACK

Set up a virtual rain gauge by entering GPS coordinates, or pick the position from a map for the identified location to receive rainfall reports for that area.

View and monitor reports directly from the Connected Farm™ dashboard or from email alerts, so you can save time traveling to dispersed gauges or manually tracking precipitation.

MONITOR

View actual rainfall activity in 10-minute increments plus accumulated rainfall over a 24-hour period so you can have a better understanding of rainfall intensity.

Determine if water may have run off the field and is unavailable to the crop, or if it was absorbed into the soil and can be available to the crop.

MANAGE

Make better-informed decisions for irrigation and other farming operations from this accurate rainfall data. Optimize irrigation plans and application timing, and compare yield against rainfall to plan for next season's crop.

WM-Topo Survey System

The WM-Topo™ survey system is a portable topographic data collector that can be taken into areas inaccessible to tractor or truck mounted survey equipment. Collect survey data by hand when poor field conditions exist, or crops are too mature to allow vehicle access.

Survey data can then be transferred to Farm Works™ Surface software or directly to the Trimble® FmX® integrated display, and used to create surface models as a basis for better-informed water management decisions.

FOR USE DURING DRAINAGE PROJECTS

Gather topographic field data using the WM-Topo system, then transfer that data via USB stick or Connected Farm™ to Farm Works Surface software or the FmX display to create a 3D model of the field.

Take the WM-Topo system back out to the field to flag locations where drainage tile should be installed, then utilize the Trimble WM-Drain® farm drainage solution to complete the drainage job.

FOR USE DURING LEVELING PROJECTS

Follow along behind a scraper performing grade checks with the WM-Topo system. This portable system allows you to check your leveling project's accuracy as you go.

Topographic data gathered with the WM-Topo system can also be used on the FmX display to create leveling designs for use with the FieldLevel™ II system for water management.

WM-Drain Farm Drainage Solution

Trimble's WM-Drain® farm drainage solution connects the survey, analysis, design, installation, and mapping steps in surface and subsurface drainage projects.

When combined with the FmX integrated display and RTK-level corrections, the WM-Drain solution ensures optimal 3D tile placement, which improves crop yields by controlling surface ponding, optimizing root depth, maximizing the planting season, and minimizing nutrient loss.

SURVEY

Collect 3D field data with ease by using the FmX display or WM-Topo survey system.

ANALYZE

Analyze the 3D field data using Farm Works Surface software to make better-informed drainage decisions.

DESIGN

Design and verify a complete 3D drainage system using Surface software in the office, or design drainage lines on-the-go without having to leave your vehicle.

INSTALL

Take your designs back to the field and utilize the WM-Drain module on the FmX display and Trimble's 3D machine control technology for precise installation of your pipe or surface ditches.

MAPPING

Map the true location of your installed drainage pipes or ditches and utilize the records for future maintenance or drainage expansion projects.

FieldLevel II System

The FieldLevel™ II system utilizes lessons learned from more than 30 years of industry leadership in high-precision GNSS applications and land leveling. Combining these core competencies has resulted in a highly reliable, easy-to-use land leveling solution for farmers and contractors.

GPS and GLONASS satellite constellations are used by the FmX® integrated display to provide the highest performance RTK positioning available for use in FieldLevel II operations. The FmX display streamlines the survey, design, and grading steps required for land leveling, and can also be used for designing and installing rice levees when used in conjunction with Farm Works™ Surface software.

Land Leveling

SURVEY

- Map your fields with RTK measurements
- Create boundaries, interior points, and sections
- Calculate and report the true acreage of your field

DESIGN

- Create a best-fit surface using Autoplane technology
- Define primary and cross slopes for prescribed orientation and grades
- Utilize Multiplane design software for more complex field requirements

LEVEL

- Drive the scraper hydraulic valves automatically
- Level your fields using any type of tractor and scraper
- Operate both tandem and dual scraper systems

Levee Design & Installation

SURVEY

- Capture 3D topographic data using the FieldLevel II Survey Design and Install module on the FmX display, or with the WM-Topo system

DESIGN

- Using Farm Works Surface software, analyze the shape of the field using 3D viewer, contours, flow arrows, and tributary information
- Define the start point, vertical intervals, and turn radius capability of the machine you're using and Surface software will determine the most optimal levee locations in the field

LEVEL

- Utilize a Trimble® Autopilot™, EZ-Pilot®, or EZ-Steer® steering system to guide the tractor as the levees are being installed

Lasers and Grade Control

Laser Transmitters

Trimble offers an entire line of Spectra Precision® laser transmitters that can be used to manually perform a variety of water management tasks and ensure that the water on your field is distributed evenly. Laser transmitter options for various needs and budgets are available.

SPECTRA PRECISION LASER GL700 SERIES

The Spectra Precision GL700 is Trimble's most advanced laser transmitter, offering unmatched accuracy and beam stability. Use the GL700 for automatic machine control applications when a high level of accuracy—up to 1500 feet (450 meters)—and the capability to set single or dual slopes on your field are required.

SPECTRA PRECISION LASER GL600 SERIES

The Spectra Precision GL600 is a highly reliable laser transmitter series for growers requiring the ability to set single or dual slopes in their field. Packed with features, GL600 series lasers are ideal for field leveling applications using automatic machine control. Both the GL612 and GL622 can be used up to 1300 feet (400 meters).

SPECTRA PRECISION LASER AG401

The Spectra Precision AG401 is Trimble's entry-level laser transmitter. It is ideal for growers with zero-grade fields who do not need to adjust the grade. It is a self-leveling laser that can be used for automatic machine control at long ranges up to 1500 feet (450 meters).

Grade Control Systems

By adding automated grade control systems to your leveling or drainage equipment, you can improve your productivity and accuracy by up to 50%. Trimble provides a wide range of agricultural machine control systems to fit your application and budget.

AG GCS300/400 GRADE CONTROL SYSTEM

The AG GCS300 and the AG GCS400 systems are Trimble's most advanced grade control systems, offering multiple capabilities to growers and water management contractors. The systems connect directly to almost all machine types and also work with external control valves. They can be used for any application offering control, survey, and indicate modes.

AG GCS200 GRADE CONTROL SYSTEM

The AG GCS200 system is ideal for vehicles with PT valves requiring dual rigid mast control or single electric mast control. The key components of the system are the CB60 control box and the LR410 laser receiver. The system includes a digital elevation display and can be used in both survey and control modes.

AG GCS100 GRADE CONTROL SYSTEM

The AG GCS100 system is Trimble's most economical grade control system. The system is designed specifically for vehicles pulling scrapers, or drainage machines requiring connection with a PT valve. The key components of the AG GCS100 system are the CB40 control box and the LR40 laser receiver. The system delivers excellent performance in long-range applications with adverse environmental conditions and operates with a single receiver on a rigid mast.

FLOW & APPLICATION CONTROL

- Precisely manage your crop inputs and make better-informed flow and application control decisions throughout the crop cycle
- Increase profits by creating uniform yield across the field
- Reduce input costs by eliminating excess material application
- Lessen environmental impact by decreasing over-application
- Reduce operator fatigue by automating applications

GreenSeeker & WeedSeeker Products

GreenSeeker Crop Sensing System

The GreenSeeker® crop sensing system is a variable rate application and crop vigor mapping system that offers a more efficient and precise way to manage crop inputs such as nitrogen.

- The GreenSeeker system can be used to verify the amount of nitrogen the soil has made available, then determines a nitrogen prescription on-the-go for instant application
- The correct amount of fertilizer is delivered in real time, averaging an increase in profits of $15 per acre

GreenSeeker Handheld Crop Sensor

The GreenSeeker handheld crop sensor is an affordable, easy-to-use measurement device that can be used to assess the health—or vigor—of a crop.

- Readings taken by the GreenSeeker handheld can be used to make non-subjective decisions regarding the amount of fertilizer to be applied to a crop, resulting in a more efficient use of fertilizer—a benefit to both a farmer's bottom line and the environment
- Use the Connected Farm™ scout app on a smartphone or tablet to calculate fertilizer application rates from crop readings taken with the GreenSeeker handheld

WeedSeeker Automatic Spot Spray System

The WeedSeeker® system helps you cut overall weed control costs by up to 80% by saving on chemical costs, cutting down on time and labor, and reducing the environmental impact of your field activities.

- Uses advanced optics and computer circuitry to sense if a weed is present
- When a weed enters the sensor's field of view, it signals a spray nozzle to deliver a precise amount of herbicide
- The WeedSeeker system will spray only weeds, not bare ground, and is effective wherever weeds occur intermittently

Field-IQ Crop Input Control System

Trimble's Field-IQ™ crop input control system is a section control and variable rate application control system that prevents seed and fertilizer overlap, controls the rate of material applications, monitors seed delivery or fertilizer blockage, and controls the height of spray booms.

The Field-IQ system runs on the TMX-2050™ display, FmX® integrated display, and CFX-750™ display. Each of these displays supports a different combination of Field-IQ functionality—giving you the ability to choose the interface option that fits your needs.

AUTOMATIC SECTION CONTROL

- Manage seed, liquid, and anhydrous using section control on up to 48 individual sections
- Overlap detection shows where you've been and what you've done

SEED MONITORING

- Advanced seed monitoring increases the quality of seed placement by delivering singulation details from the seeding system to the operator, allowing for on-the-go planter tuning
- Prevent costly planter problems by catching them early before they cause yield reduction
- See results of singulation analysis including information on population, singulation, skips/multiples, spacing, and quality of spacing

VARIABLE RATE APPLICATION CONTROL

- Simultaneously control the application rate of up to six different materials when using the FmX integrated display, including seed, granular seed, granular fertilizer, liquid, and anhydrous ammonia in different combinations
- Two material rate control capability when using the CFX-750 display, and single material rate control when using the TMX-2050 display for spraying
- Variable rate control of materials can be achieved with a prescription VRA map or in real time with a GreenSeeker® system for more efficient fertilizer utilization
- As-applied mapping records where you've applied inputs and automates record keeping
- Adjust your seed population, fertilizer rates, or spray application manually or using a prescription created with Farm Works Software® solutions
- Apply a high population to fertile or well-irrigated soils to maximize yield potential while reducing the rate on less fertile or poorly irrigated soils
- Automatically control spinner speed of spreader application systems to evenly distribute nutrients when using the FmX display

BOOM HEIGHT CONTROL FOR SPRAYERS

- Automatically adjust spray boom height with ultrasonic sensors that measure the distance between ground or crop canopy, resulting in an even application of material
- Minimize environmental impact and ensure the health of neighboring crops by eliminating off-target applications of products
- Automatic height sensing reduces operator fatigue by eliminating the need for manual boom switching
- Compatible with the TMX-2050 display and CFX-750 display

Field-IQ Crop Input Control System

RAWSON® DRIVE

- Drives piston pumps for more efficient operation during planting
- Single drive can run up to 24 row units
- Mounts to a number of planting, drilling, air seeding, piston pumps, and strip till applicators
- Compatible with the FmX integrated display and CFX-750 display, and works with many third party controllers

TRU COUNT AIR CLUTCH®

- Use for automatic section control to eliminate seed overlap in your headlands and point rows
- Compatible with the FmX integrated display, CFX-750 display, and a variety of other guidance displays

TRU COUNT LIQUIBLOCK VALVE™

- Use for automatic section control to eliminate liquid fertilizer overlap
- Compatible with the FmX integrated display, CFX-750 display, and a variety of other guidance displays

HARVEST

- Map and view yield and moisture data in real time
- Receive accurate yield calculations—even while harvesting in difficult conditions
- Gather multiple years of reliable data
- Use yield data to instantly understand how your crop performed
- Enhance your understanding of how seed and other field activities affect yield
- Improve decisions to optimize the next year's crop

Yield Monitoring & RG-100 Row Guidance

RG-100 Row Guidance System

The RG-100 row guidance system allows you to automatically adjust the combine in response to changes in the rows by using existing sensors built into the combine head. The RG-100 system uses the Autopilot™ automated steering system and FmX® integrated display to center the combine on rows—even when they are not straight.

- Reduce fatigue in difficult conditions such as down corn, curved rows, long passes, and other poor visibility conditions
- Operate effectively in fields planted using other steering systems or in areas where the planter drifted
- Stay on line to efficiently gather ears of corn—and ultimately increase your yield
- RG-100 row guidance works with advanced T3™ terrain compensation technology in the Autopilot system for high-accuracy steering on rolling hills and slopes

Yield Monitoring

With Yield Monitoring, you can accurately collect yield and moisture data for a variety of grain crops. This information is critical for precision agriculture operations—allowing you to perform valuable analyses to enhance your decision making on your farm, season to season.

- Map and compare the performance of different seed varieties throughout your field
- Record the amount of grain harvested and loaded onto your trucks
- Determine if grain needs to be stored or dried based on the in-field moisture content
- Adjust the cut width automatically when traveling over odd-shaped fields, point rows, or other previously harvested areas to avoid inaccurate yield calculations
- Transfer yield data to your office using a USB stick or wirelessly with Connected Farm™ to analyze how seed varieties compared to yield
- Utilize your yield data to create variable rate prescription maps and send them wirelessly from the office to the field using Connected Farm

CONNECTED FARM

- Use with any brand of equipment and any size of farm
- Wirelessly connect the field to the office using displays, tablets, and smartphones
- Save time by avoiding USB drives for data transfer
- Make better decisions by simplifying your data management
- Provides a complete solution for data collection, sharing, and analysis

COLLECT, SHARE, AND MANAGE INFORMATION

Connected Farm™ allows you to collect, share, and manage information in real time. Information can be accessed from any location using your computer, tablets, smartphones, and Trimble's TMX-2050™ display. It is also compatible with a mixed fleet so that you can share information between multiple vehicles operating in the same field. Connected Farm delivers the next generation of information management capabilities with unmatched performance and efficiency.

COLLECT

- Receive files from Trimble® TMX-2050, FmX®, CFX-750™ displays, and mobile devices
- Import boundaries and scouting data from the Connected Farm scout app
- Capture crop imagery from the Gatewing UX5 unmanned aerial system (UAS)

SHARE

- Transfer guidance lines, coverage maps, tank levels, and more between multiple vehicles in the same field
- Reduce employee downtime in the field by accessing Trimble displays remotely to diagnose a problem
- Transfer prescription maps, yield data, drainage designs, and more between the field and office

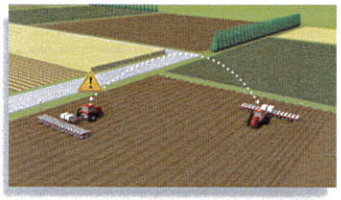
MANAGE

- View real-time information on commodity prices, rainfall totals, field operation maps, fleet locations and productivity, irrigation status, and more
- Access data in the office seamlessly using Farm Works Software® solutions for profit mapping analysis and field reporting

PROTECT

- Your data belongs to you
- Data is protected and secure using Trimble's network of worldwide servers
- Access original files from guidance displays if needed

Connected Farm



VEHICLE TO VEHICLE DATA EXCHANGE

- View instant yield and moisture data between multiple harvesters in the same field
- Share guidance lines, acres covered, speed, and coverage maps between multiple planters in the same field

REMOTE ASSISTANT

- View most Trimble® display screens remotely
- Eliminate operator downtime

OFFICE TO FIELD DATA EXCHANGE

- Wirelessly transfer guidance lines, drainage designs, variety maps, yield data, and variable rate prescription maps between the office and field
- Save time unloading data from the cab by avoiding USB flash drives

FLEET PERFORMANCE AND PRODUCTIVITY

- Manage fuel usage, battery voltage, oil pressure, and other valuable diagnostics
- Monitor vehicle health and performance

1 NEW! PRECIPITATION MONITORING

- Check rainfall totals accumulated over a 24-hour period from a virtual rain gauge
- View a graph of actual rainfall activity in 10-minute increments to gain a better understanding of the rainfall intensity

2 NEW! IRRIGATION MONITORING

- View irrigation system locations, pivot speed, status (on/off), current voltage, and more
- Toggle to Irrigate-IQ™ software to create no spray and variable rate irrigation areas for applying the right amount of water in the right place

3 FLEET POSITIONS AND ALERTS

- View fleet positions overlaid on background imagery
- Identify current status of vehicles such as on/off, idling, moving, delayed, speeding, and traveling

Connected Farm

4 WEATHER FORECASTING

- View weather forecast weekly, daily, or hourly
- Monitor future precipitation and wind to assist in the management of field operations

5 COMMODITY PRICES

- Create your own commodity list and rearrange it to your preference
- Save time by having prices at your fingertips without accessing other websites

6 FIELD OPERATION MAPS

- View yield and application maps once they are completed in the field
- Find inefficiencies or operator mistakes before moving on to the next field

CONNECTED FARM™ FLEET APP

- View fleet positions and status overlaid on background imagery
- Navigate to equipment from your current position using turn-by-turn directions
- Receive geo-fence and curfew alerts

CONNECTED FARM SCOUT APP

- Map areas, flags, and field boundaries
- Enter scouting information and capture images of problem areas
- Calculate nitrogen rates by using NDVI crop readings from the GreenSeeker handheld crop sensor

Scan to download the fleet app

App Store

Google play

Scan to download the scout app

Farm Management Software

FREE! FARM WORKS™ VIEW

- Compatible with a wide range of precision farming displays
- View and print basic maps with legends
- Build a list of clients, farms, fields, supplies, and other details

FARM WORKS MAPPING

- Includes all the features of View software
- Print a variety of maps and field record reports
- Create, edit, and manage guidance paths
- Analyze profit maps to verify which parts of the fields are more profitable

FARM WORKS ACCOUNTING

- Calculates cash and accrual general ledgers with single entry
- Allocate expenses and revenue for each field, livestock group, machine, and structure
- Track inventories for supplies, harvested crops, and livestock
- Print a variety of financial reports for taxes

FARM WORKS SURFACE

- Import field topography data
- Utilize the drawing tools to tie laterals to mains, create parallel lateral spacings, and clip drainage lines
- Create levee paths
- Layout and design drainage tile by size, pipe type, and phase

Mobile Solutions

FARM WORKS MOBILE

- Map field boundaries and other points of interest with GPS
- Utilize grids or management zones for soil sampling
- Enter scouting information such as weed and insect types, notes, digital images from a camera, and more
- Compatible with the GreenSeeker® system for logging data and real-time variable rate application

JUNO™ 3 HANDHELD

- Microsoft® Windows® Embedded 6.5
- Integrated GPS and camera with optional modem
- 3.5 inch (8.9 cm) screen

JUNO T41™ HANDHELD

- Microsoft Windows Embedded 6.5
- Integrated GPS and camera with optional modem
- 4.3 inch (10.9 cm) screen

YUMA™ 2 RUGGED TABLET COMPUTER

- Microsoft Windows 7 Professional
- Integrated GPS and camera with optional modem
- 7 inch (17.8 cm) screen