



Department of
Agriculture and Food



GRDC Grains Research &
Development Corporation
Your GRDC working with you

Soil water measuring & managing: What is happening in WA

Yvette Oliver - CSIRO

25th Feb 2014



Scoping study on soil water

- Who's doing what
- What the issue are
- What training was needed

Information came from

- Literature and web, email surveys, workshops held in Narrogin, Kellerberrin, Geraldton and Esperance, Soil Water Champions meetings



Soil Water Champions

- **Yvette Oliver – CSIRO**
- **Dennis van Gool, Rob Grima, David Hall, Jeremy Lemon and Caroline Peek – DAFWA**
- **Julianne Hill and Cameron Weeks - Regional Cropping Solutions Network Co-ordinators**
- **Rebecca Wallis – Grower Group Alliance**
- **Frank D’Emdem – Precision Agronomics Australia**
- **Geoff Fosbery - Consult Ag**
- **David Stead – Anasazi Agronomy**
- **Craig Topham – Agrarian**



Who is doing what?

- Measuring soil water in trials – CSIRO, DAFWA, Liebe group, WANTFA
- Yield Prophet - which uses soil characterised previous, few are doing new characterisations
- MyCrop – estimate of Plant Available Water Capacity (PAWC) to estimate Yield potential
- Soil water probes – GDRC, RCSN and individual farmers
- Not measuring but interested - runoff, non-wetting, other tools
- **No co-ordination of effort, communication or common protocols**
- **Part of this role being taken on by DAFWA funded by GRDC**



Issues

- Lack of knowledge about soil water, tools and Yield Prophet®
- Gaps in soil data
- Difficulty with the picking a soil in yield Prophet
- More information about soil water probes
- Better understanding about using soil water in farm management decisions



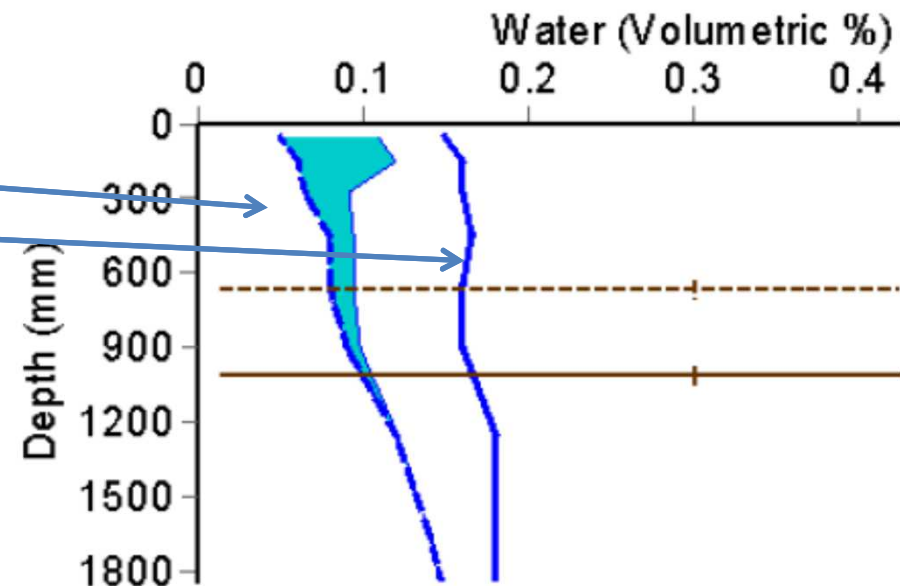
What is soil water ?

- Gravimetric soil water (g/g) –
 - weight of water (g) per g of soil
- Volumetric Soil water content (cm^3/cm^3) = %
 - weight of water per volume soil
- Soil water to depth (mm) is the soil water % multiplied by the depth
 - ie 10% water in 1m = 100mm water
- This is still not plant available water!!!!



What is soil water characterisation?

- Plant available water Capacity (PAWC)
 - Crop lower limit
 - Drained Upper limit
- Soil chemistry
- Bulk Density
- Plant available water = water content - Crop lower Limit



Use of soil water information

- Yield potential knowing PAWC – MyCrop, CliMate , Yield Prophet
- Start of season soil water
 - Uses in models at start of season conditions i.e. Yield prophet
 - In decision of dry sowing
 - Measured effect of management options on start of season soil water i.e. summer weed management, stubble management or fallow
- In-season decisions i.e. top-up N, spray top or grain marketing
- Other?



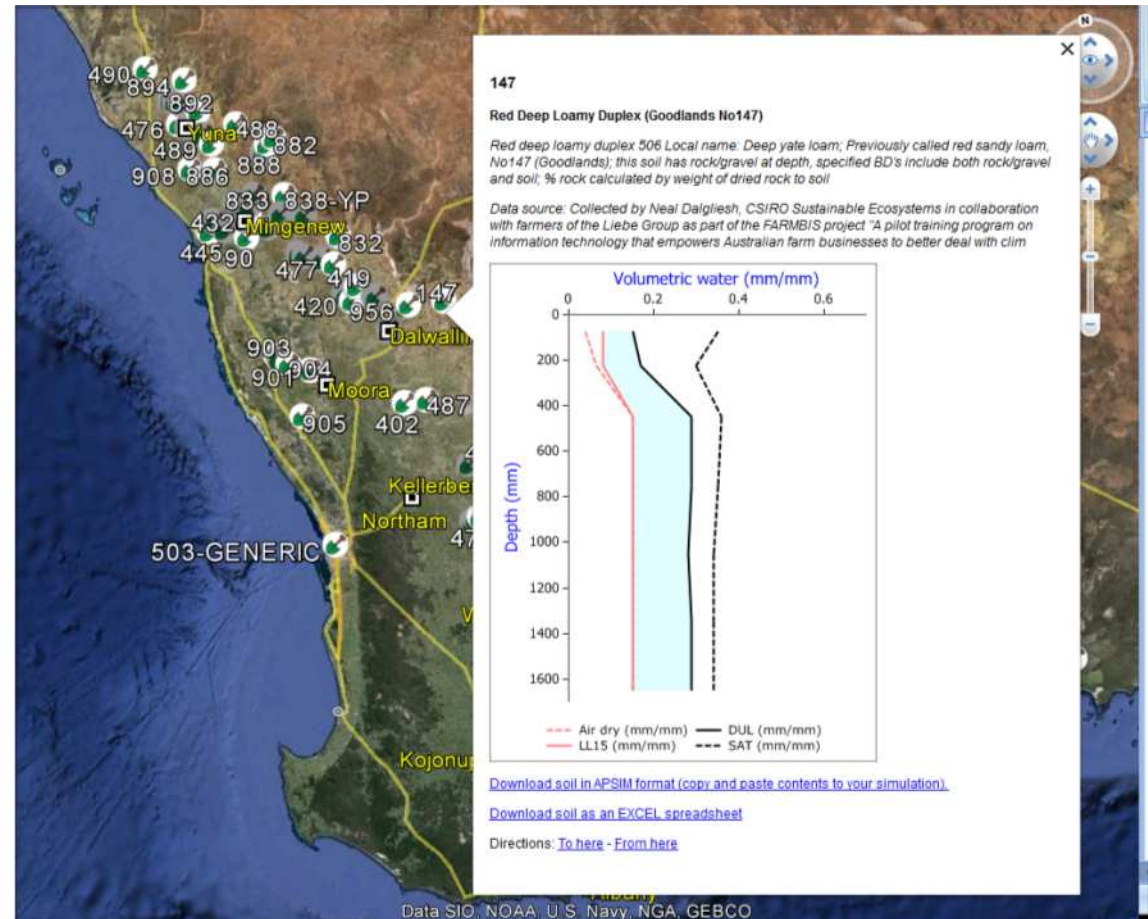
Soil Data

- APSOil – soil characterisations data – Google earth, APSIM Yield Prophet
- SoilMapp – same data as APSOil but also other soil data (ASRIS)

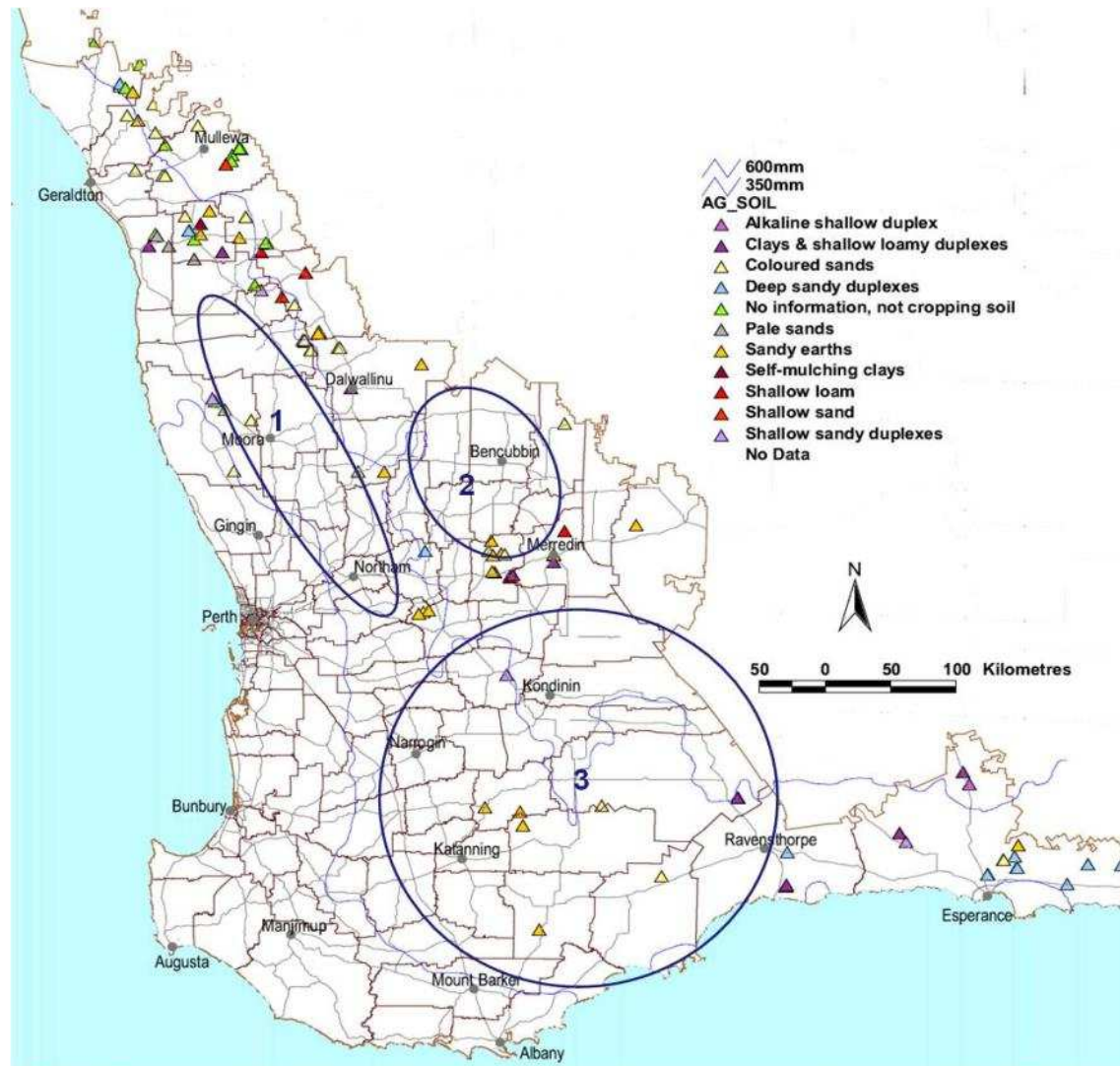


Soil Data

- APSOil – soil characterisations data – Google earth, APSIM Yield Prophet
- SoilMapp – same data as APSOil but also other soil data (ASRIS)



Soil water characterisations



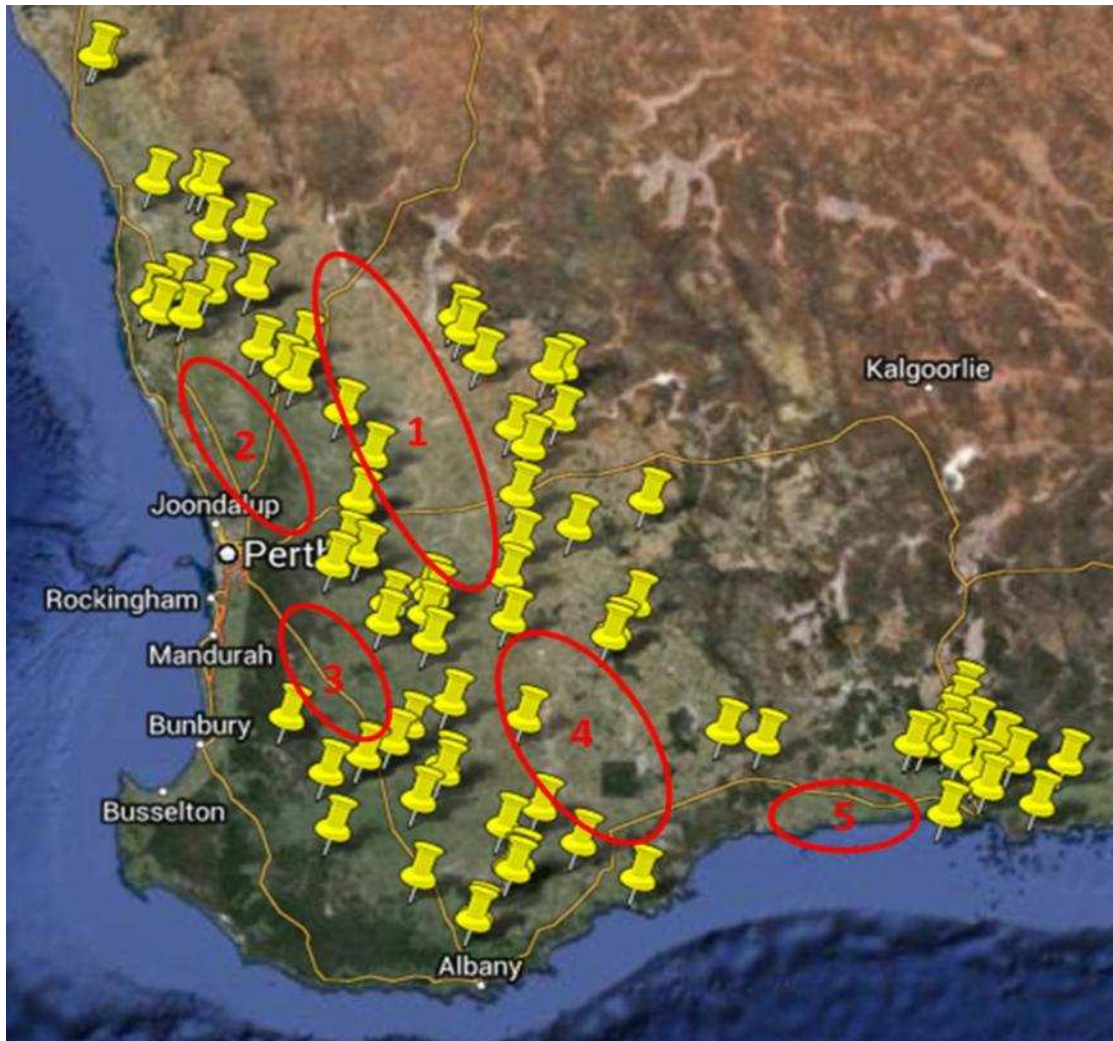
- Regional Gaps
- Soil types gap
 - alkaline shallow duplex
 - calcareous loamy earths
 - deep loamy duplexes and earths and
 - gravels.
- Many of these gaps due to soils are difficult to characterise



Issues with soil information

- **Naming of soils variable**
- **Difficulty picking a soil**
 - closest soil characterised
 - Soil type based using rules to pick based on texture and chemistry,
 - help to pick based on soil water measurements
- **Characterise yourself or pick a soil from database**
 - Do you need to be accurate or just representative?
 - Adjusting current soils
- **Subsoil constraints – some rules to adjust current soils**





Yield Prophet 2013

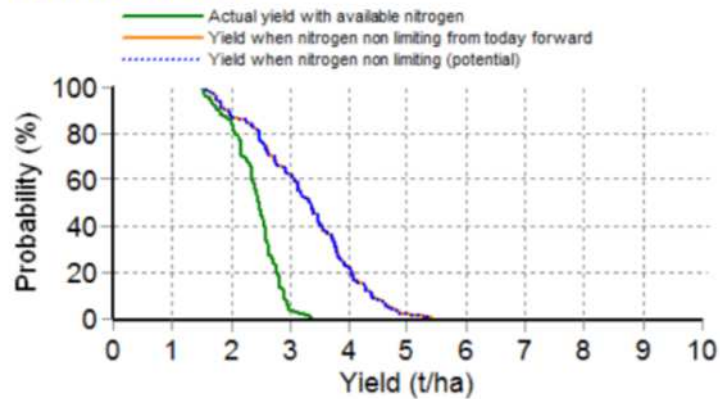
234 sites



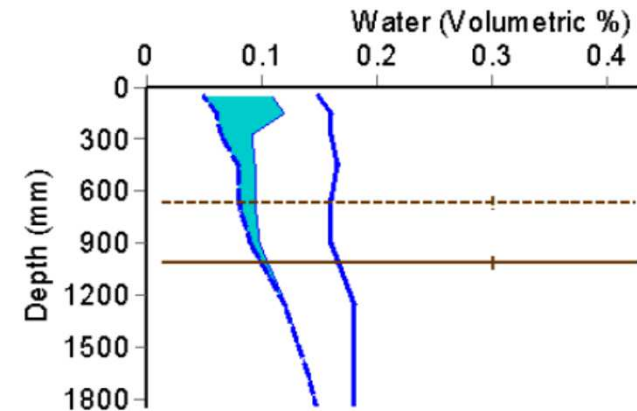
Yield Prophet

Yield Probability

Grain Yield Outcome

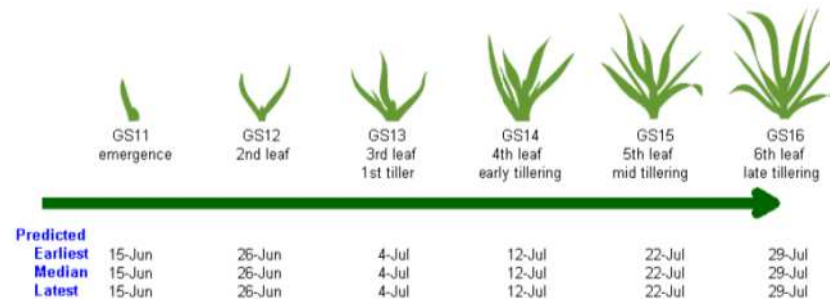


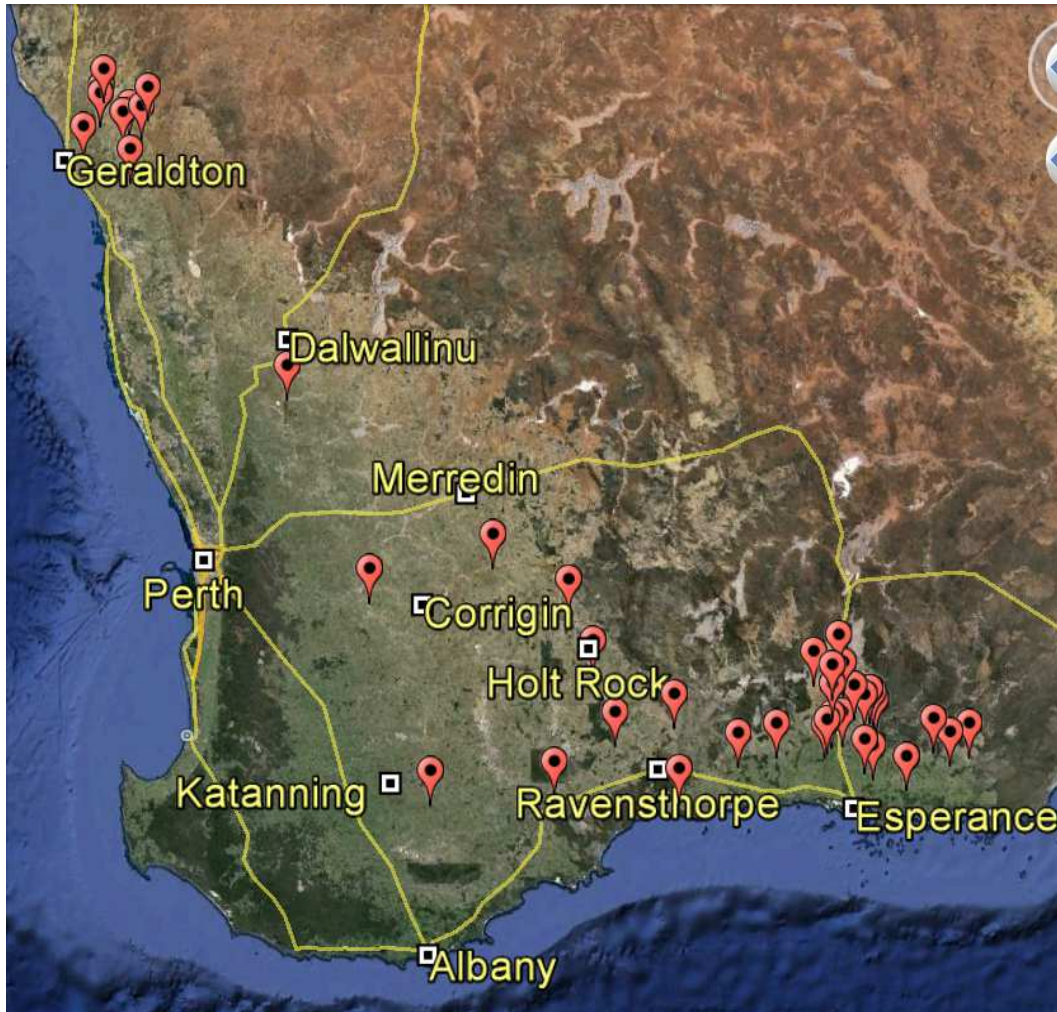
Yield and nitrogen



Soil water

Crop stage





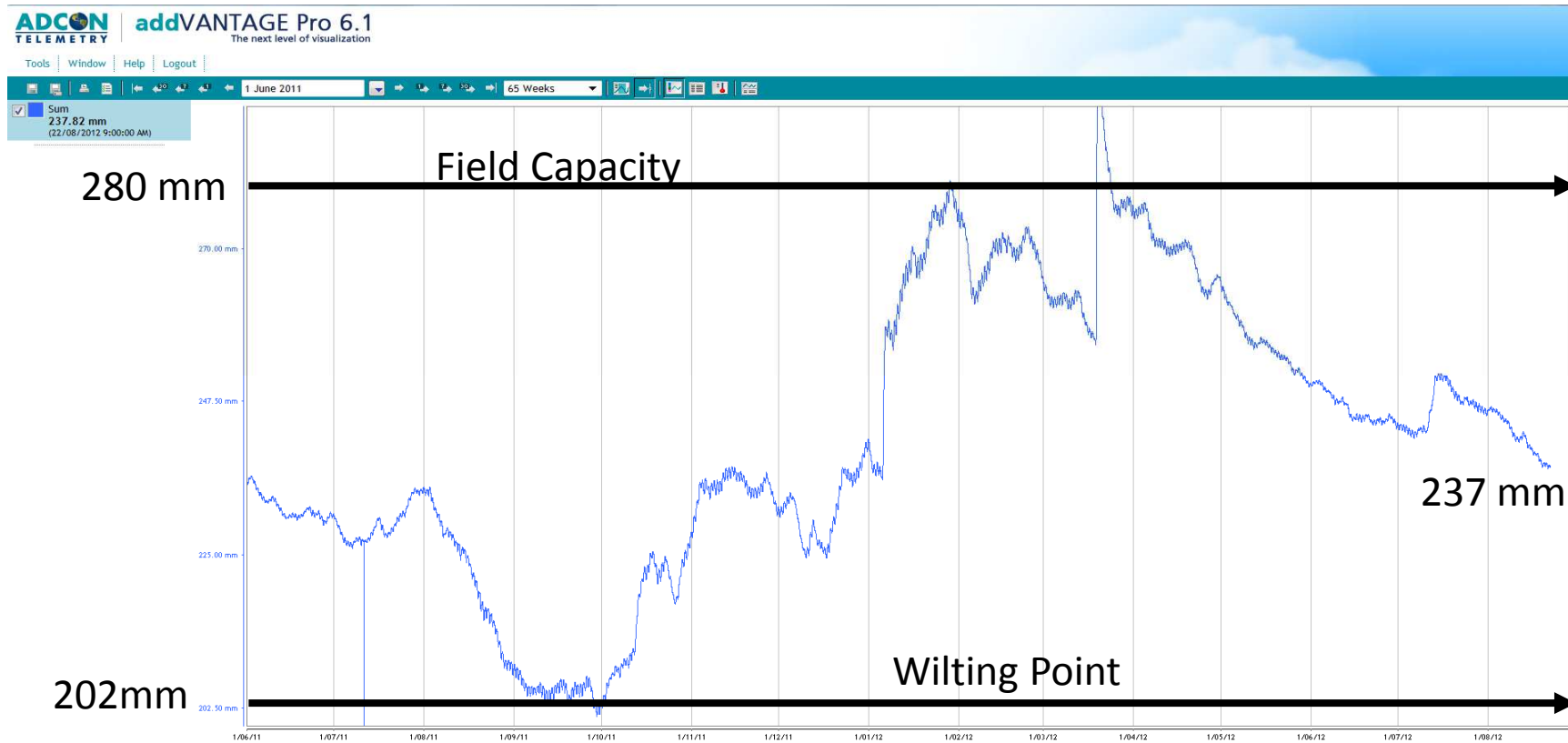
Soil Water probes

- 57 probes so far...
- May need to be calibrated
- Results are specific to that soil and paddock management
- Need to know the issues and constraints



Soil water probe outputs





Plant available water capacity = $280 - 202 = 78$ mm



What to do with probe data

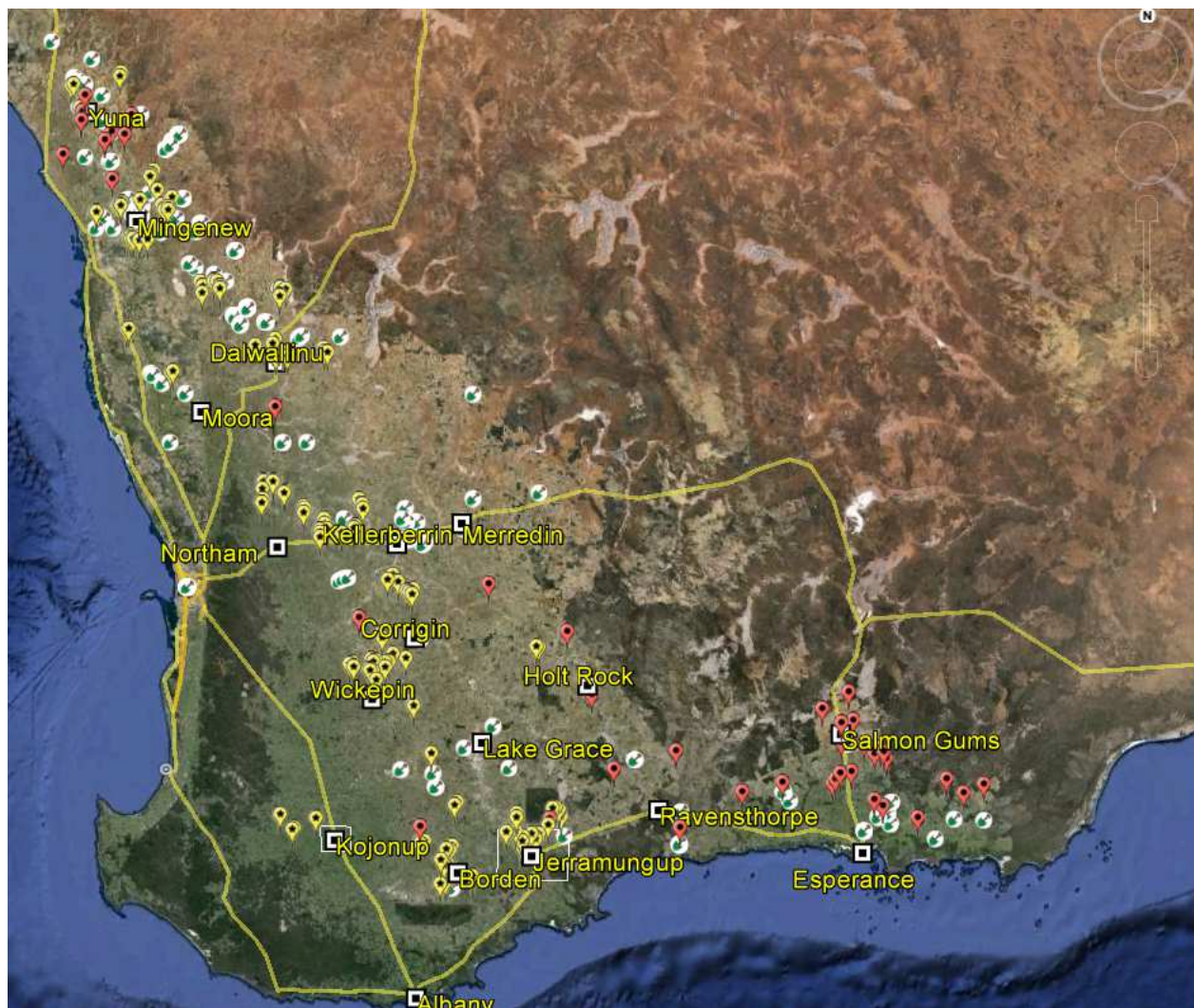
- Visual display of soil water extraction, rainfall infiltration which can show soil constraints
 - Still needs to be related to PAWC to be meaningful
- Improve Yield prophet (YP) accuracy by improved characterisations and crop parameters
 - but this comes at a cost – is YP enough?
- Addition of weather stations at site improves YP and farmer knowledge
- Still not sure how to use this data in crop management



Where to next with soil water

- Co-ordination of soil water information – Soil water champions and DAFWA coordinator
- Filling gaps in characterisations
- Training – basic and advanced
- More thinking about why, when and how we need soil water information for farm management decisions





Filling the gaps – regional and soil type

Focus paddock
Apsoil sites
Soil water probes

Work with Grower
groups/Consultants





Department of
Agriculture and Food



GRDC Grains Research &
Development Corporation
Your GRDC working with you

**Questions?
Want to be involved- characterisations
or workshops?**

Dr Yvette Oliver

Yvette.oliver@csiro.au

0438 982 938

