Map the season: summarising climate variability

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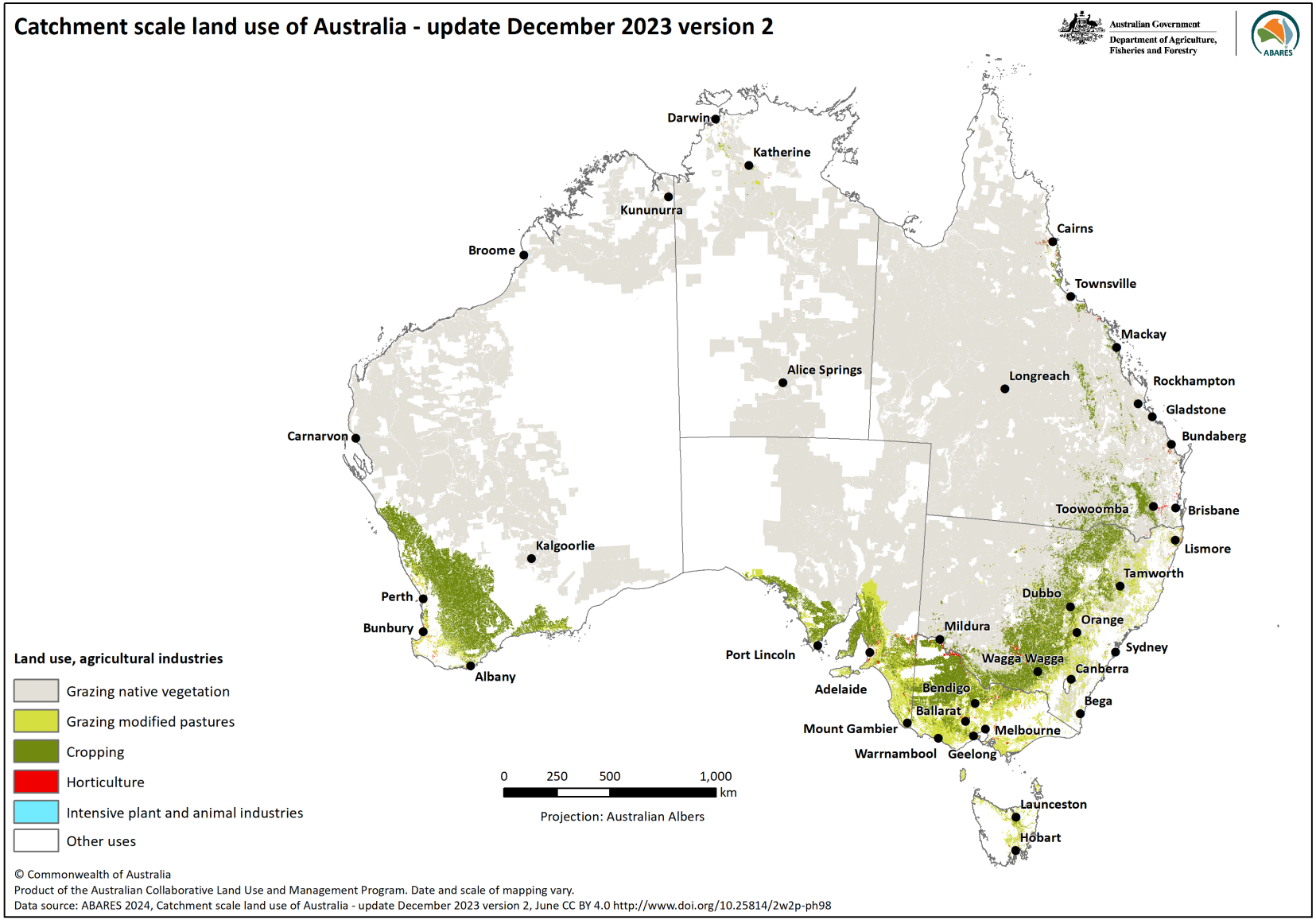
Talk overview

- What
  - Geographical area
  - Questions addressed
- Why
- How
  - Weather data: APIs and {weatherOz}
  - RMarkdown scripts
  - Render commands & YAML variables
  - Interactive shiny
- Examples

What: Geographical area



https://www.agriculture.gov.au/sites/default/files/images/CLUM_map_December2023_agricultural_industries_v2.png

What: Questions addressed

- Growing season rainfall
  - Total (mm)
  - Relative to historical data (decile)
  - Historical median (mm)
  - Anomaly (mm, %, relative to median mm)
- Extreme weather
  - Heat stress
  - Frost
  - Erosion strength wind
- Break of season
- Potential yield
- Green bridge risk
- Thermal time

Why?

- Date ranges
  - Bespoke date ranges - not ‘monthly’ or ‘three monthly’
  - Requirements driven by current season
- Reference years
- At any time – not just at the end of the month
- Quick turn around - ‘next day’
- Derived measurements - soil water, potential yield

How: Weather Data

- Queries to APIs
- RMarkdown scripts
- R package: `weatherOz` available from https://github.com/ropensci/weatherOz

How: Weather Data - the APIs

- DPIRD - Weather
  - DPIRD stations
  - Minute data; 15 minute - annual summaries
  - Many variables
  - Calculated variables: Extreme weather event endpoints
- DPIRD - Science
  - DPIRD and BOM stations
  - Daily summaries
  - Rain, min temp, max temp (limitation of our queries)
- SILO
  - selected BOM stations
  - Daily or monthly summaries
  - Many variables

How: RMarkdown scripts

- Developed incrementally, in consultation
- Create map(s) and a dated log
- Common skeleton / structure
  - Parse input variables
  - Query API for current list of stations
  - Acquire and tidy weather data
    - API
    - Saved file
  - Save data
  - Report on data
  - Make maps - iterate over variables

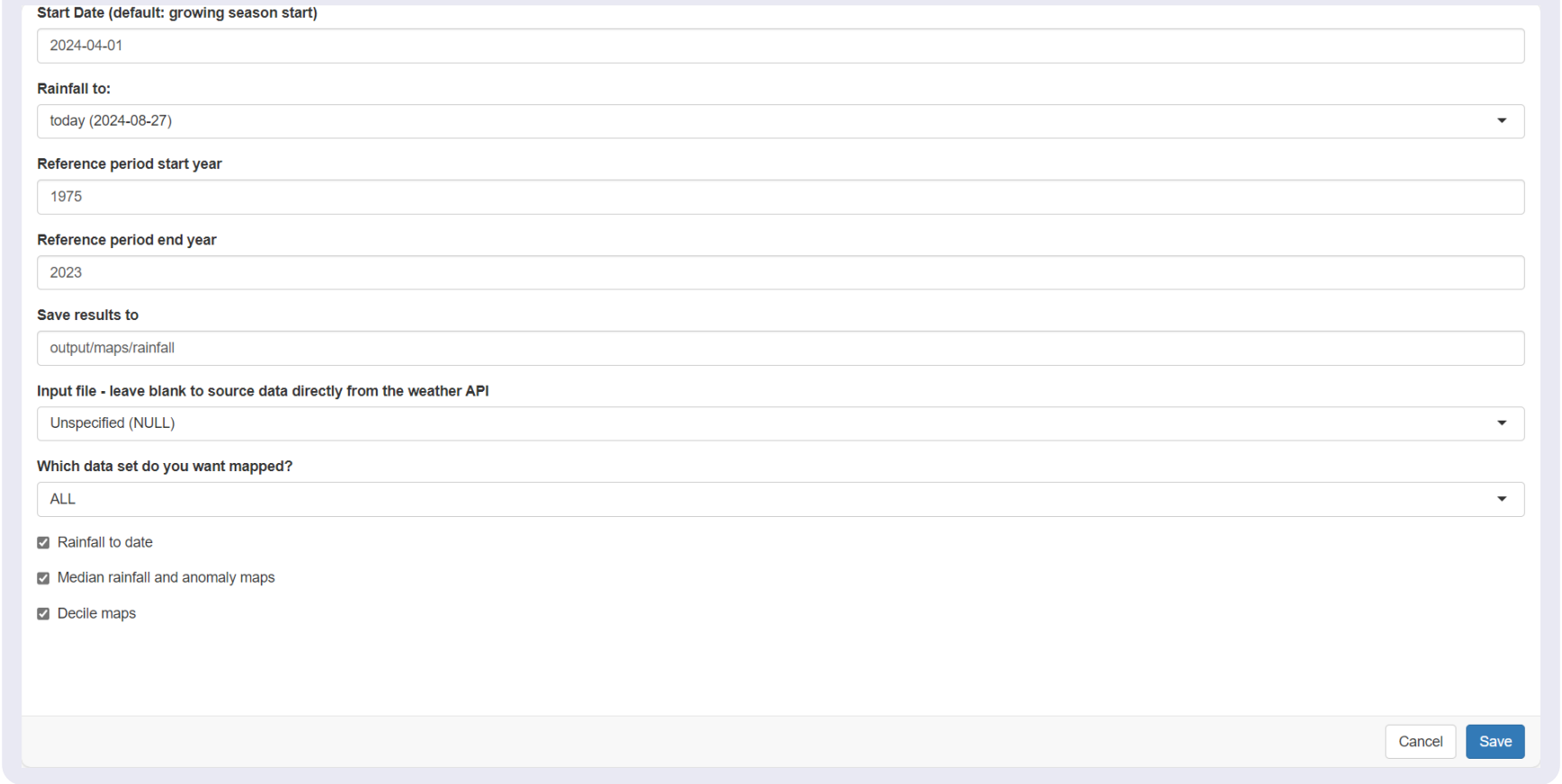
How: Render commands

The user's one bit of code

```
rmarkdown::render(
  file.path(
    "configuration",
    "scripts",
    "map_raintodate.Rmd"
  ),
  output_file =  paste0(
    format(Sys.time(), "%Y-%m-%d-%H-%M"),
    "_rain_to_date.html"
  ),
  output_dir = file.path("output","logs"),
  envir = new.env(),
  params = "ask")
```

How: Interactive shiny

The User's time to shine



How: YAML

```
---
title: "Rainfall to date"
author: "SSF-Run"
date: "`r  format(Sys.time(), '%e %B %Y at %H:%M')`"
output:
  html_document
params:
[...]
---
```

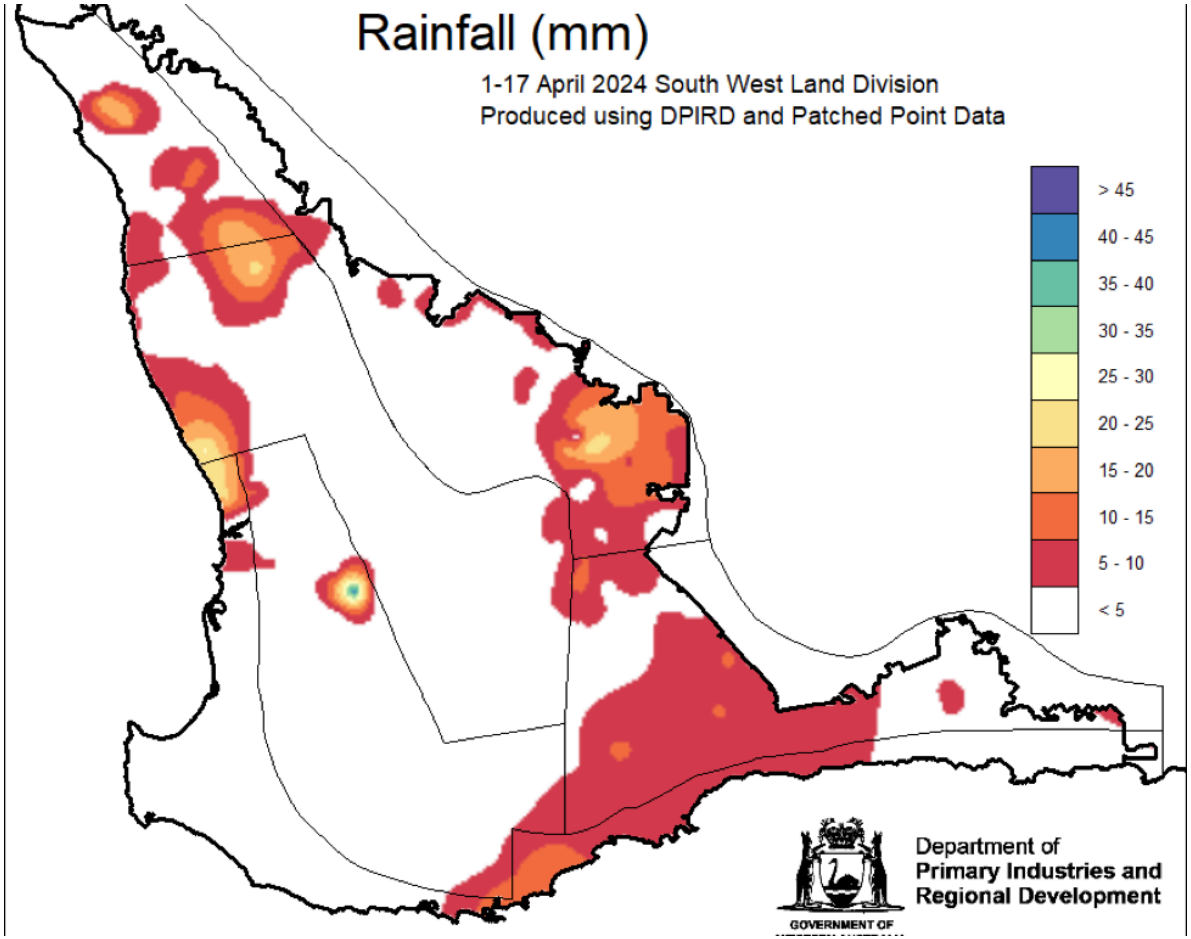
How: YAML

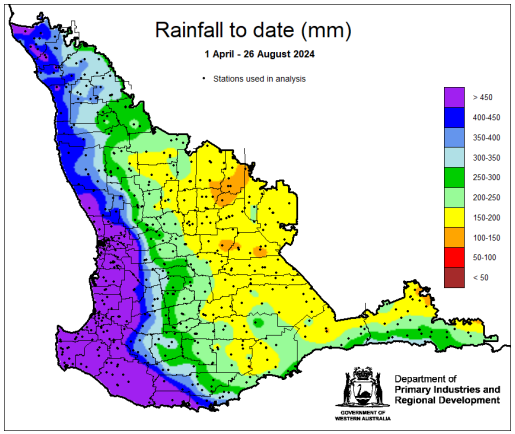
```
start.date:
  label: "Start Date (default: growing season start)"
  input: date
  value: !r as.Date(format(Sys.Date(), "%Y-04-1"))
clim.year.1:
  label: "Reference period start year"
  input: numeric
  value: 1975
set.type:
  label: "Which data set do you want mapped?"
  input: select
  choices: [AWS, PPD, ALL]
  value: "ALL"
```

How: YAML

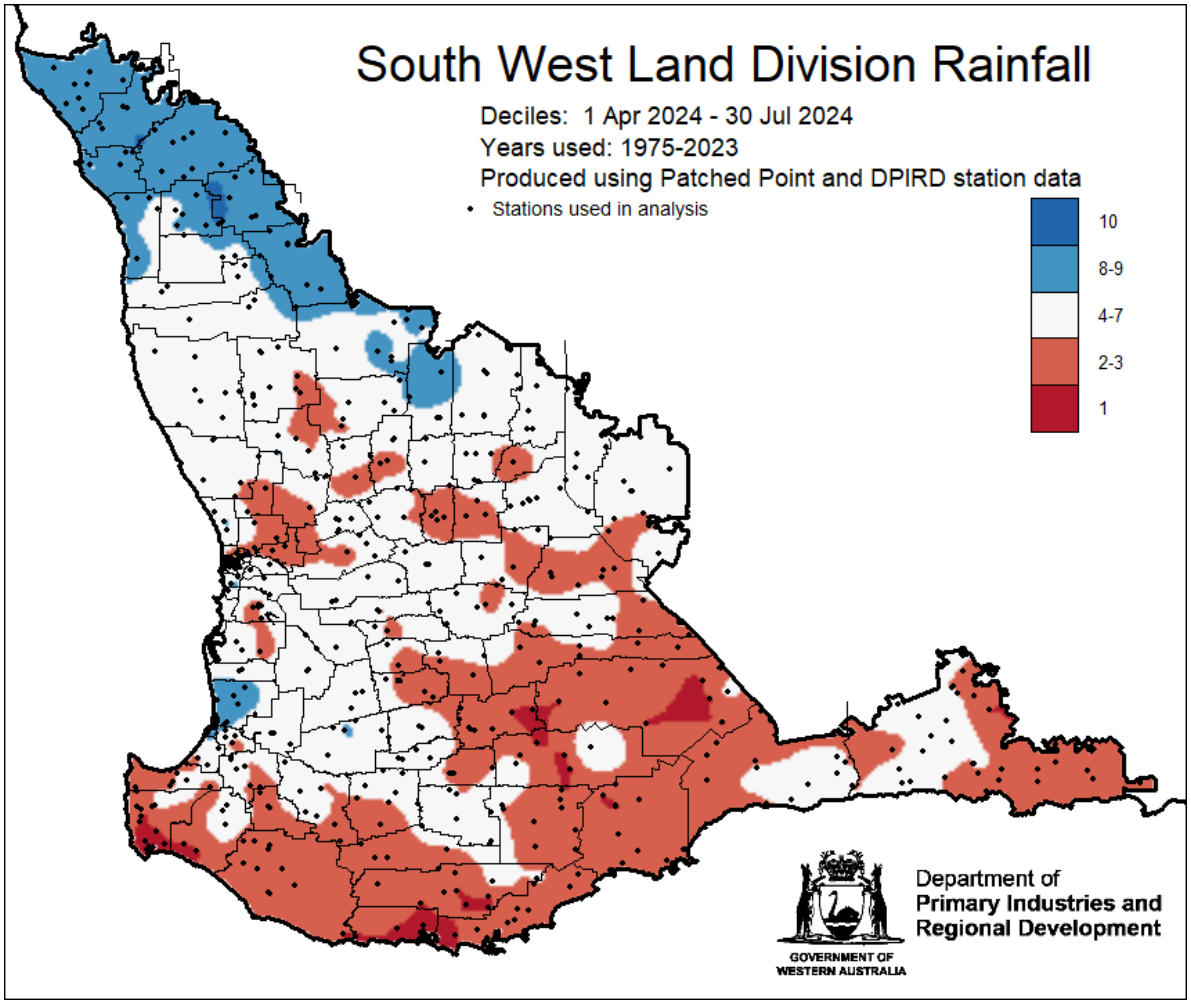
```
rtd:
    label: "Rainfall to date"
    input: checkbox
    value: TRUE
 outdir:
    label: "Save results to"
    input: text
    value: !r file.path("output", "maps", "rainfall")
 file:
    label: "Input file"
    value: NULL
    input: select
    choices: !r ssf.adjacent::find.files(file.path("..", "
```

Current Rainfall

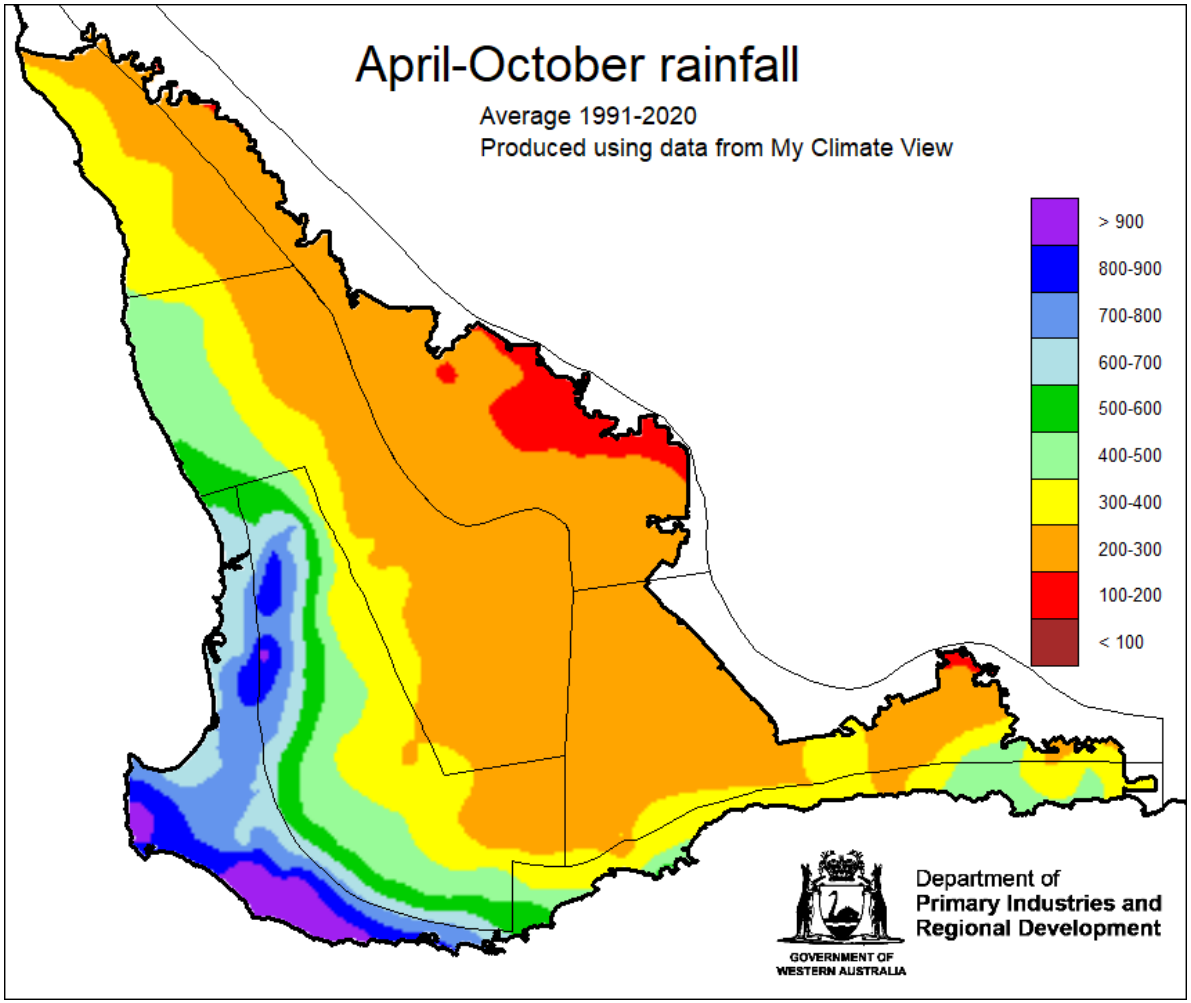


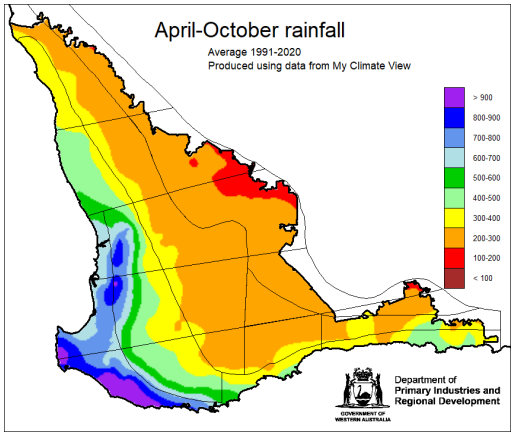


Rainfall Deciles

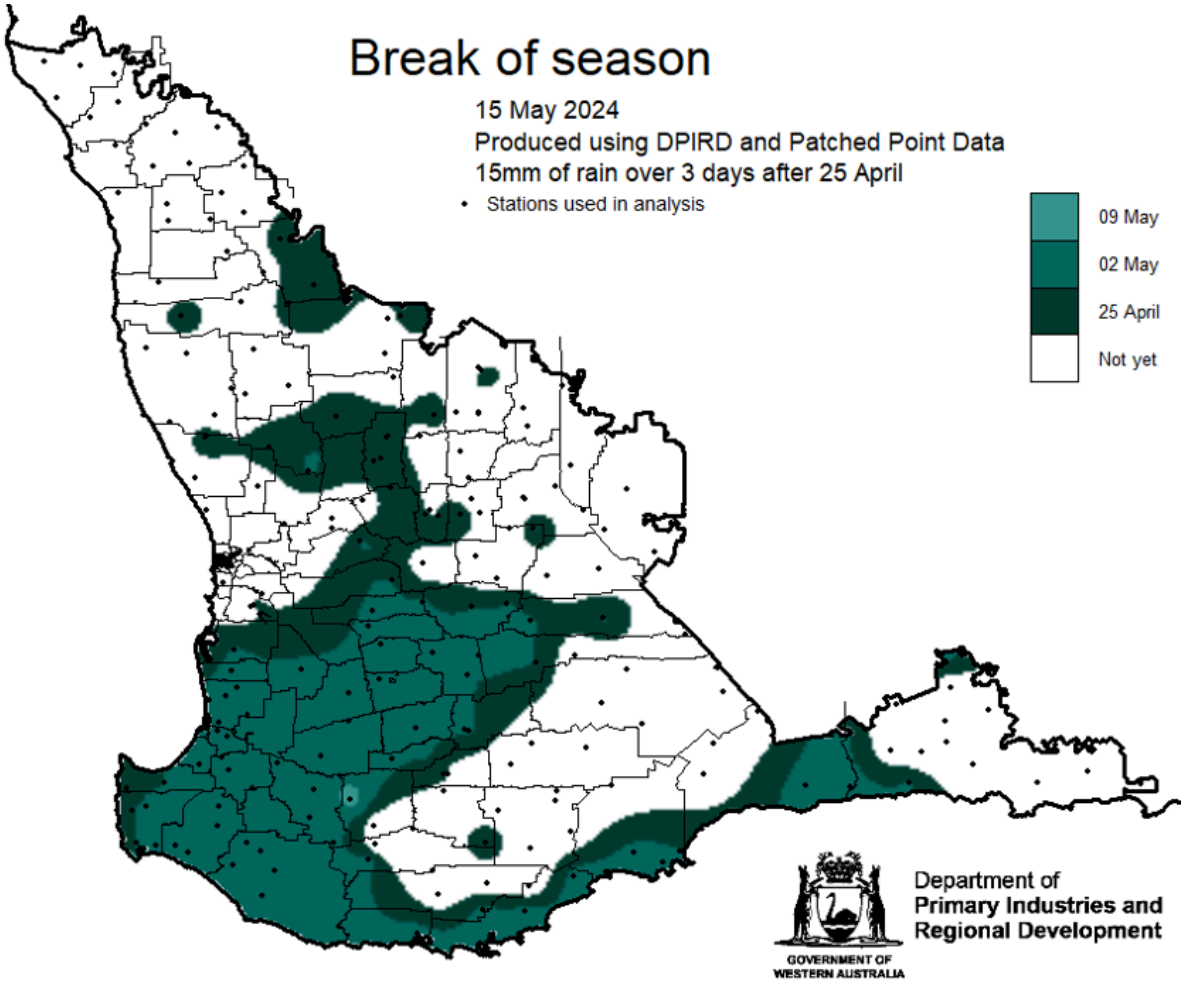


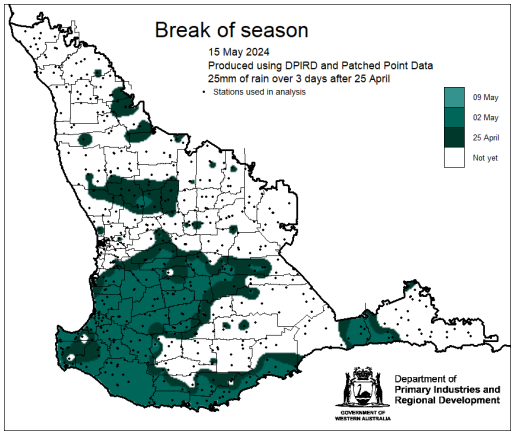
Variations - CVT & Ag zones



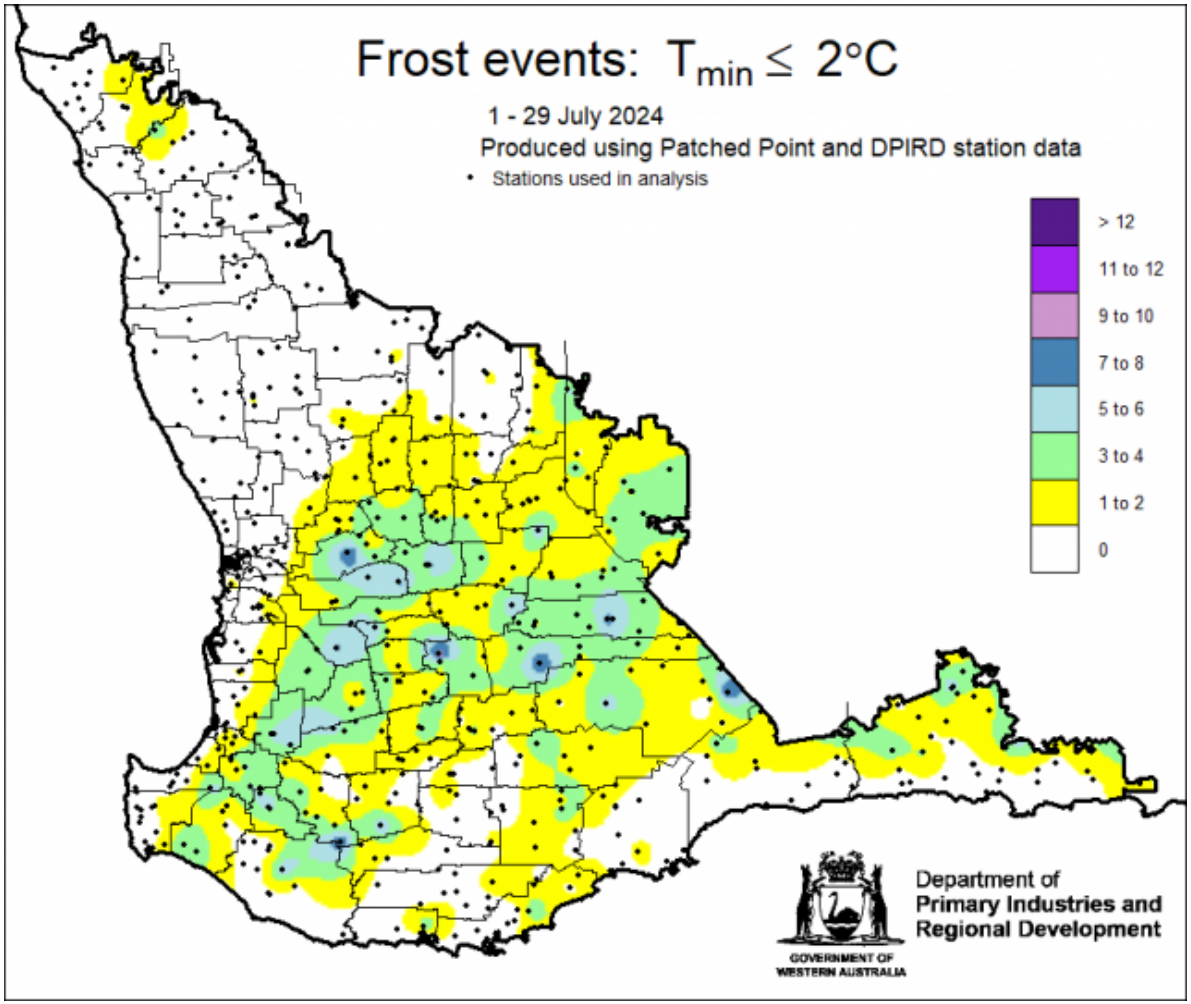


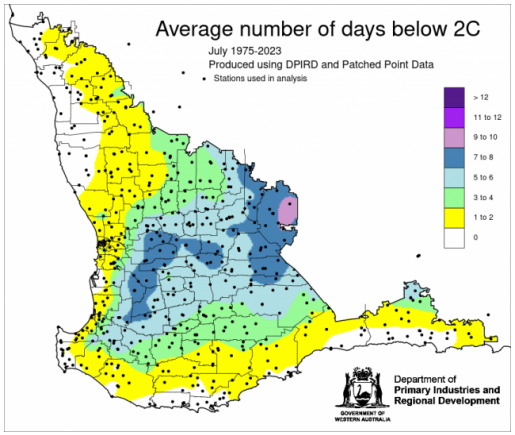
Break of Season



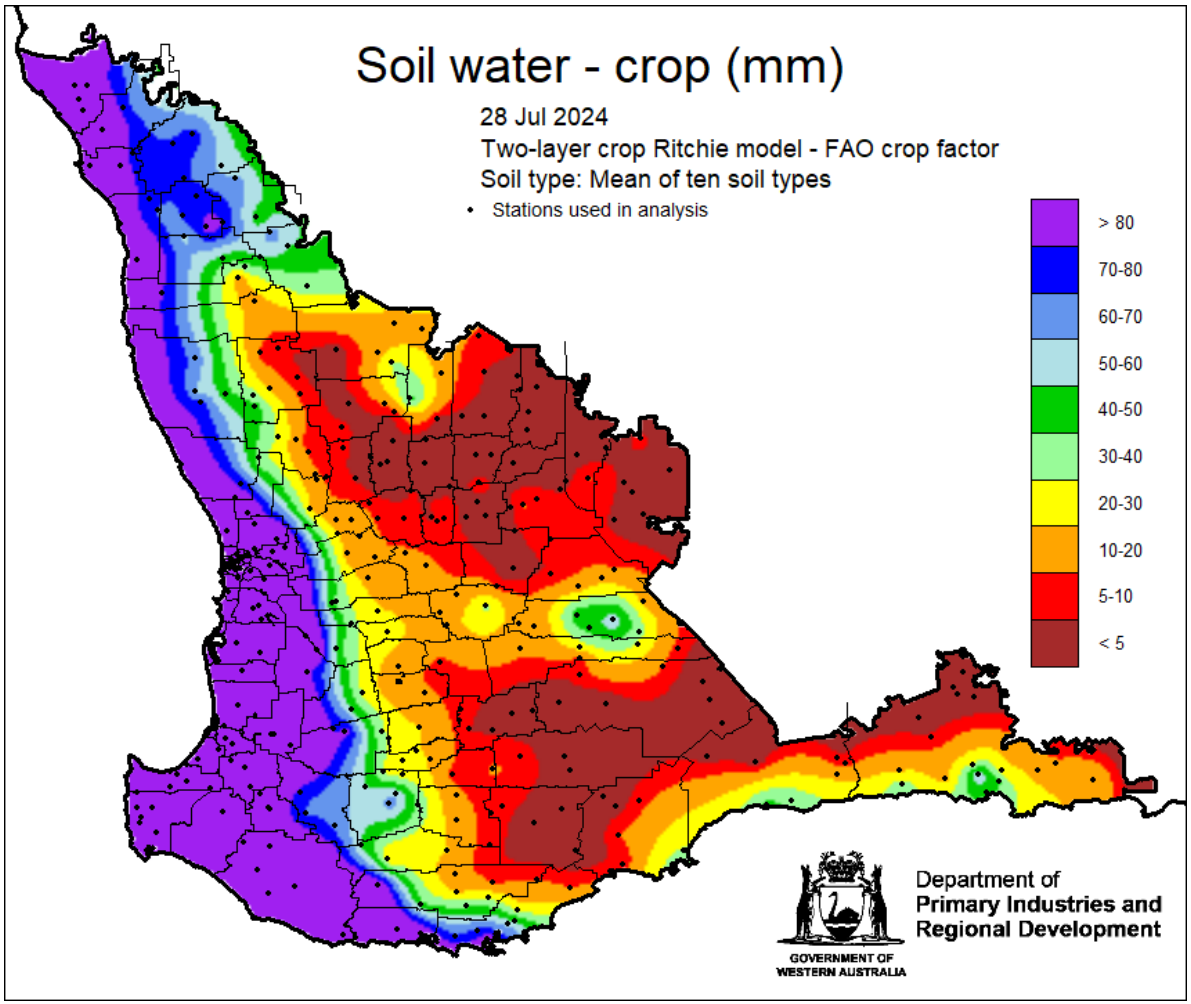


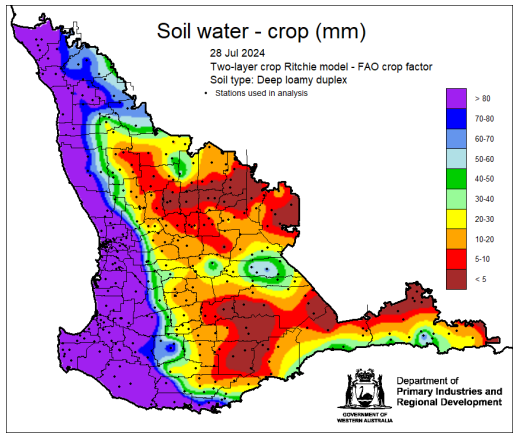
Frost Potential

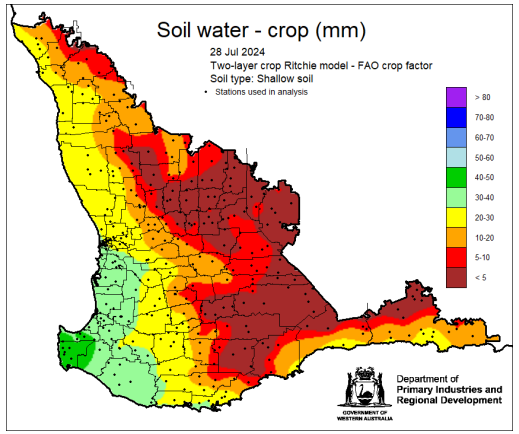




Plant Available Soil Water







Summary

- More than pretty pictures
- Useful education tools
- Targeted information for growers
- Unique information
- Rapid turnaround

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