



The pasture greenness index

WHAT IT IS, AND HOW IT LINKS WITH LIVELWEIGHT



David Phelps
DAF
Longreach

The E-Beef project is supported by a partnership comprising Southern Gulf NRM, Desert Channels Queensland, Northern Gulf RMG, and Queensland Department of Agriculture and Fisheries.



Funding for the project is from the Australian Government's National Landcare Program and the Queensland Government Drought and Climate Adaptation Program.

A brief history of e-beef

The e-beef project was inspired by earlier work and ideas:

- In South Australia in the 1990s, CSIRO and sheep producers reported the potential to link satellite information with grazing patterns, sheep productivity and healthy pastures
- However, at that stage, satellite information was not widely available and there were no in-paddock automated weighing systems
- Then in 2011 the Precision Pastoral Management Tools project started, aiming to find ways to measure cattle and pasture performance that did not require a lot of manual labour
- The project used existing information and technology, choosing the automated Walk over Weighing system that Tim Driver will talk about in the next presentation, and a satellite based greenness index
- The project worked closely with beef producers across northern Australia to identify how this information could be applied in making decisions



The pasture greenness index

The Precision Pastoral Management Tools project needed a simple, available, satellite measure of pasture performance

Pasture greenness is obviously linked to rainfall, pasture growth, diet quality and cattle growth



The pasture greenness index

We have been using a readily available pasture greenness index (the Normalized Difference Vegetation Index)

Abbreviated to NDVI, it relies on satellites measuring how much visible and near-infrared light is reflected back from the earth's surface

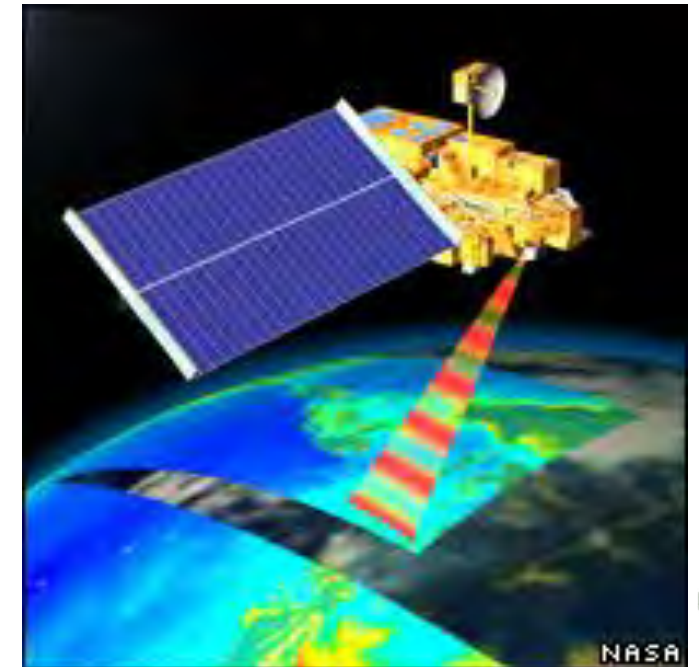
When plants are actively growing and green, they:

- strongly absorb visible light
- strongly reflect invisible near-infrared light

This means that the amount of green on the surface of the earth can be estimated from sensors on satellites

NDVI is available as maps of where green pasture is located

NDVI can be graphed as a paddock average over time



NDVI across a season

Let's step through information from Mitchell grass country in central-western Queensland

- Photographs from January to November 2014
- Graphs of the measured
 - green yield (kg/ha dry matter)
 - NDVI using a handheld sensor



Start of greening up - January



21/1/14

150 kg/ha green

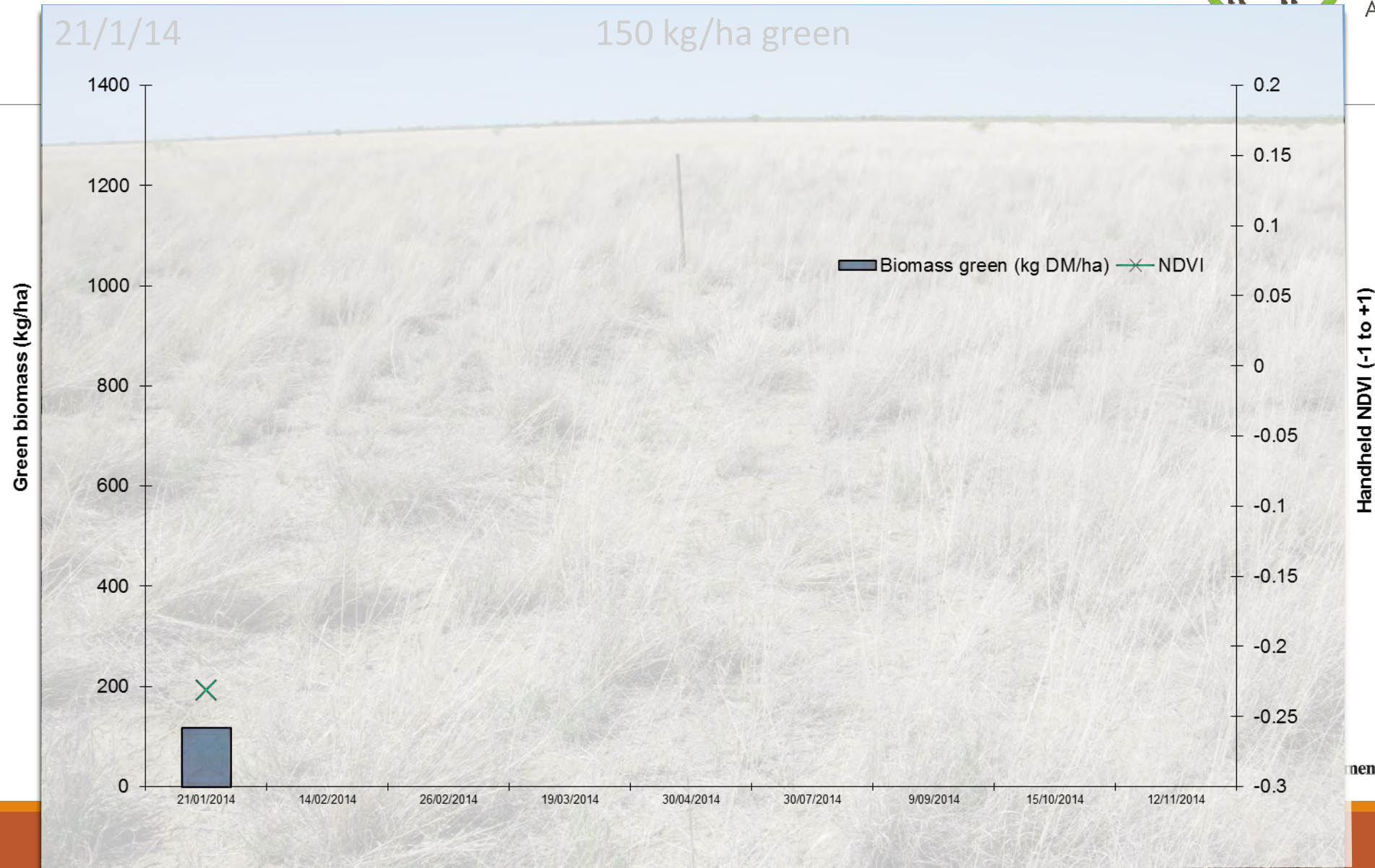


ment

National
Landcare
Program



Start of greening up - January



Greening up - February

14/2/14

1100 kg/ha green



ment



Greening up - February

14/2/14

1100 kg/ha green



Peak green - February

26/2/14

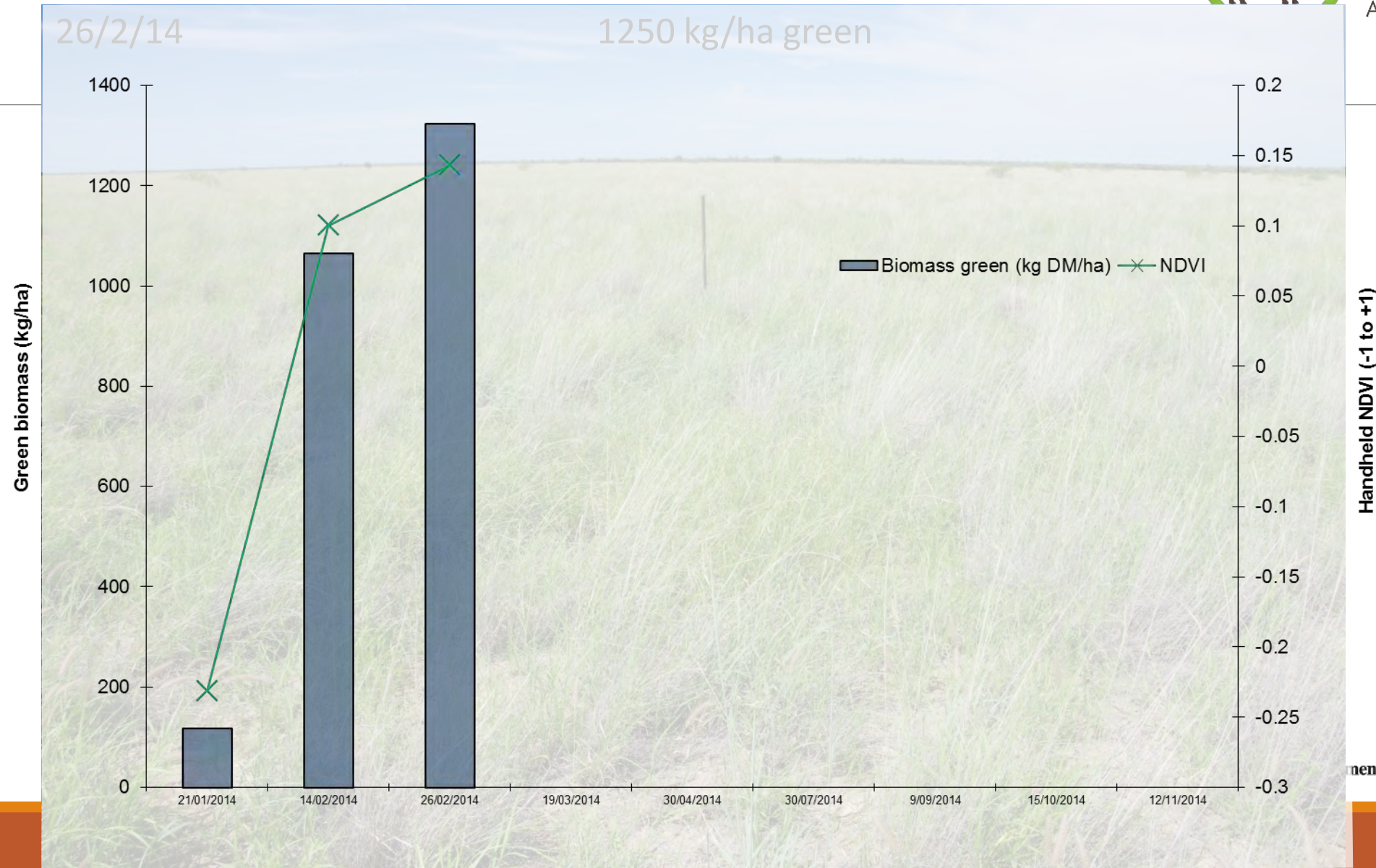
1250 kg/ha green



ment



Peak green - February



Haying off - March

19/3/14

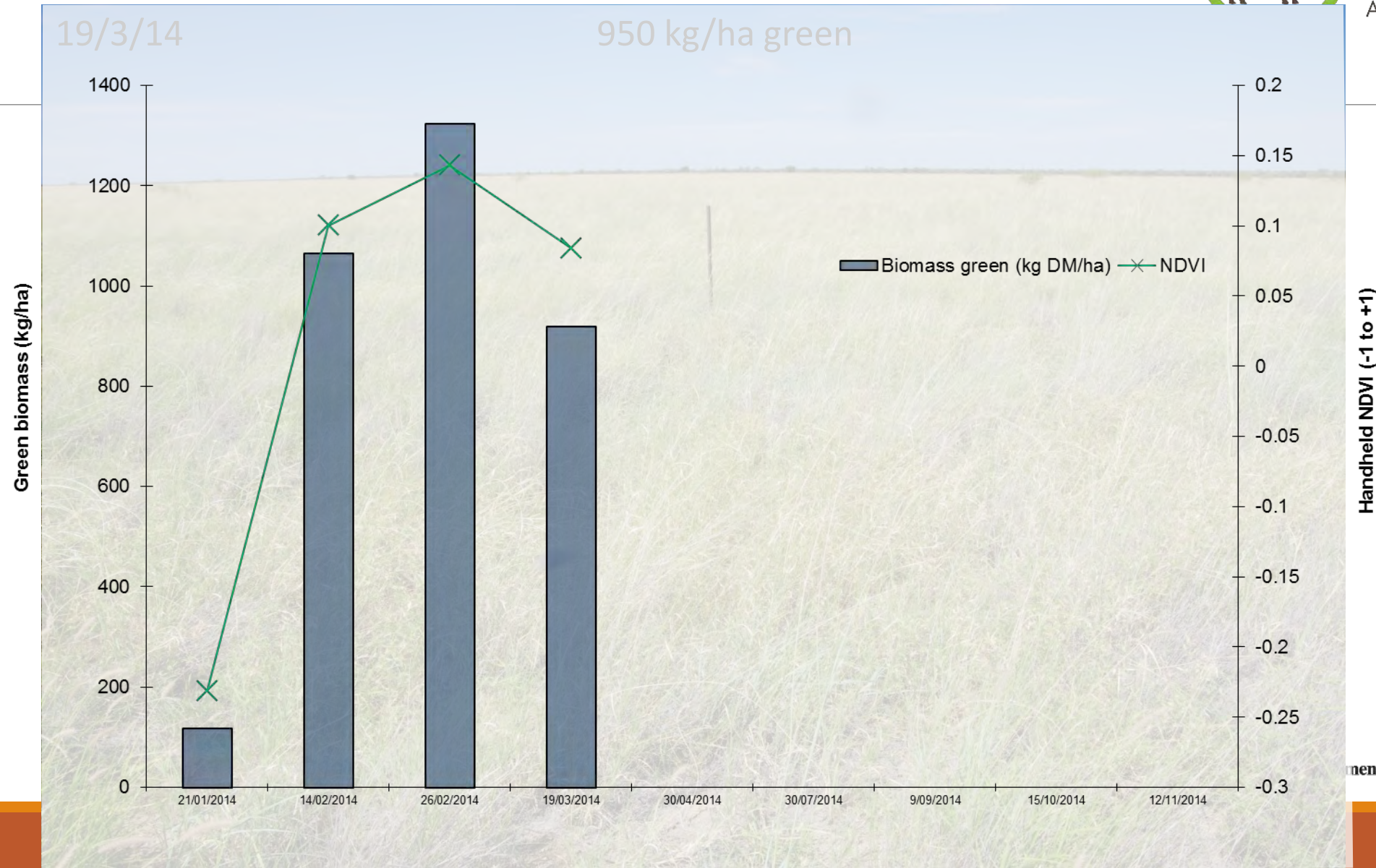
950 kg/ha green



ment



Haying off - March



Haying off - April

30/4/14

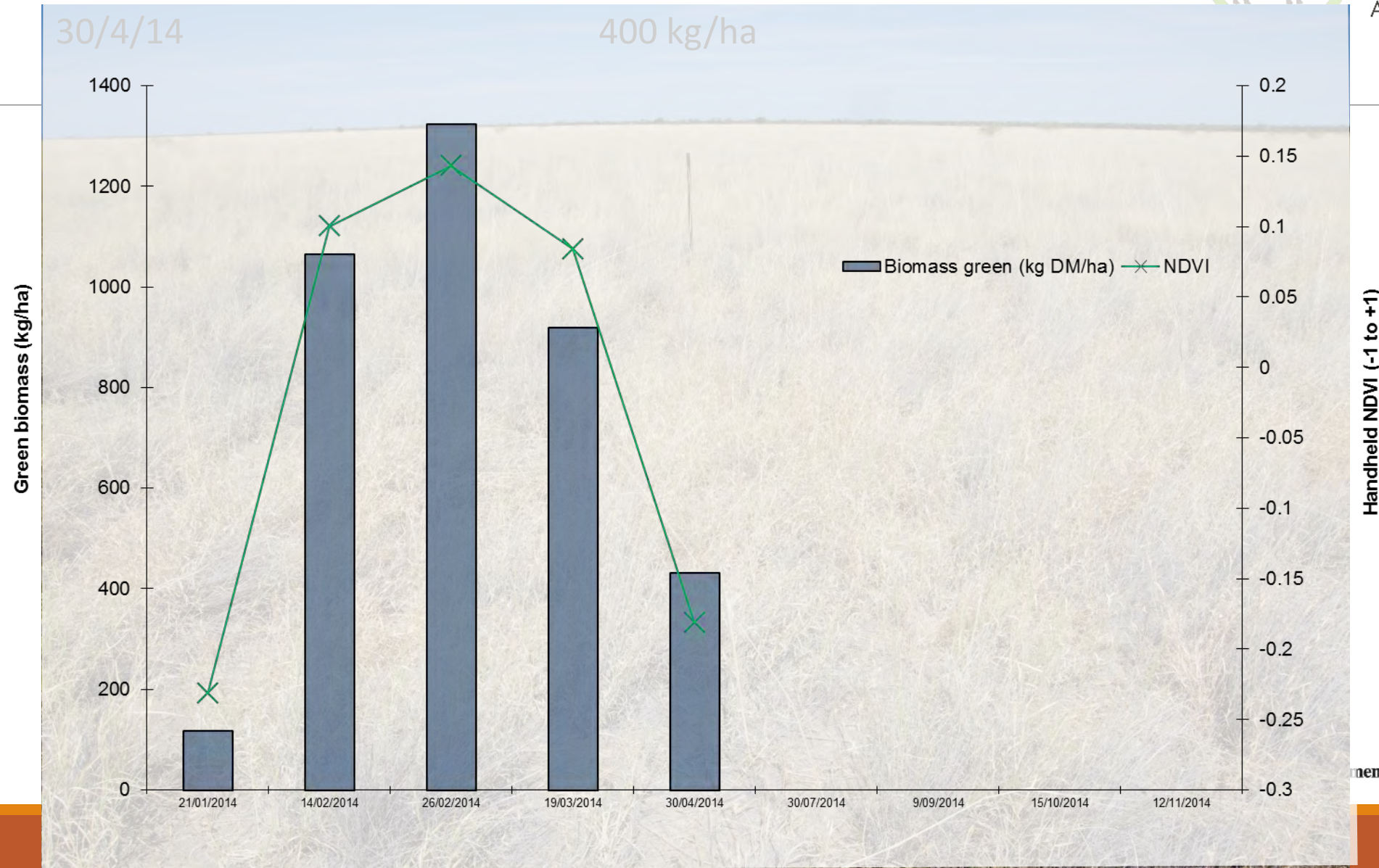
400 kg/ha



ment



Haying off - April



Haying off - July

30/7/14

200 kg/ha

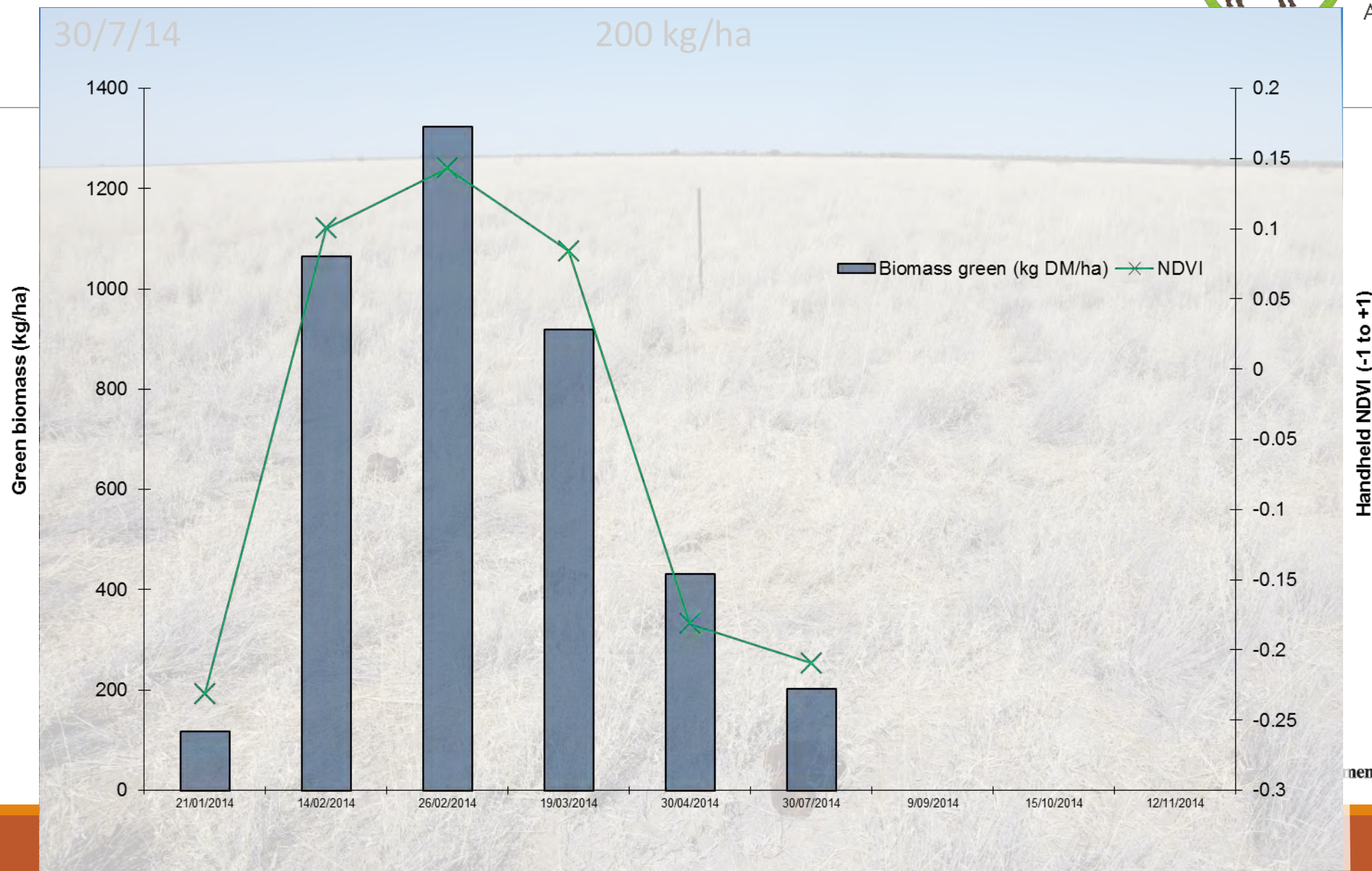


ment

**National
Landcare
Program**



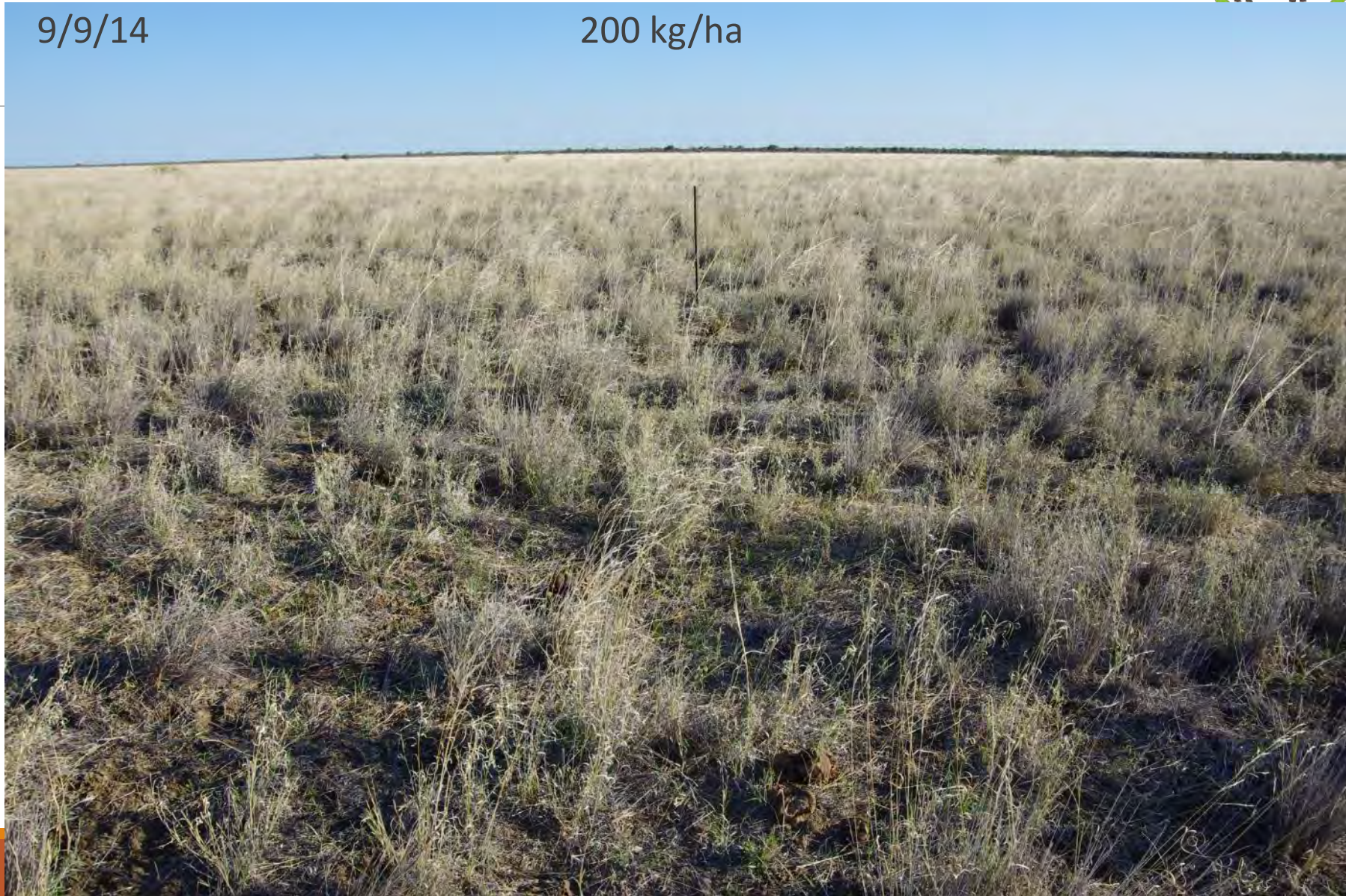
Haying off - July



Slight greening up – Sept.

9/9/14

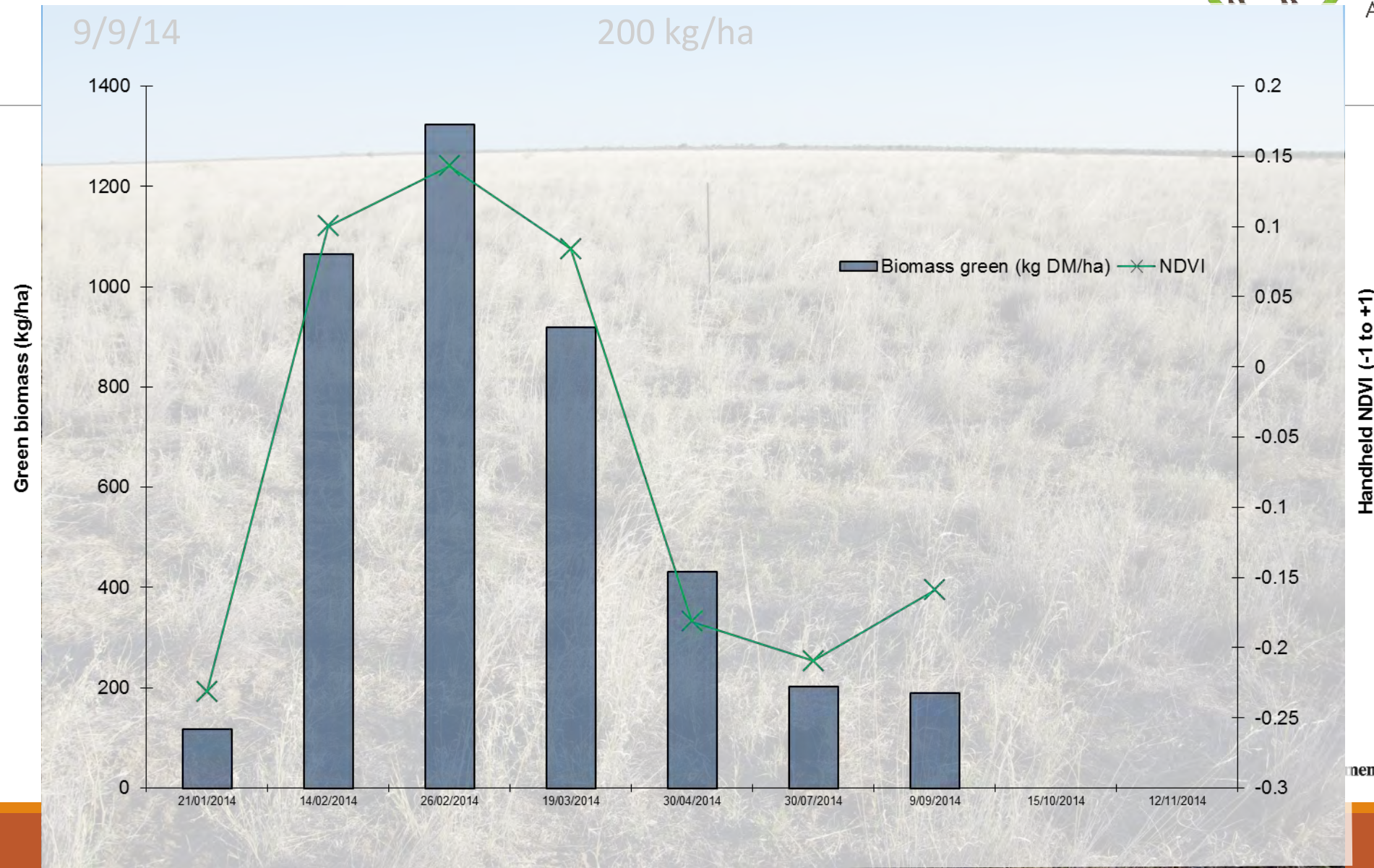
200 kg/ha



ment



Slight greening up – Sept.



Droughted - November

12/11/14

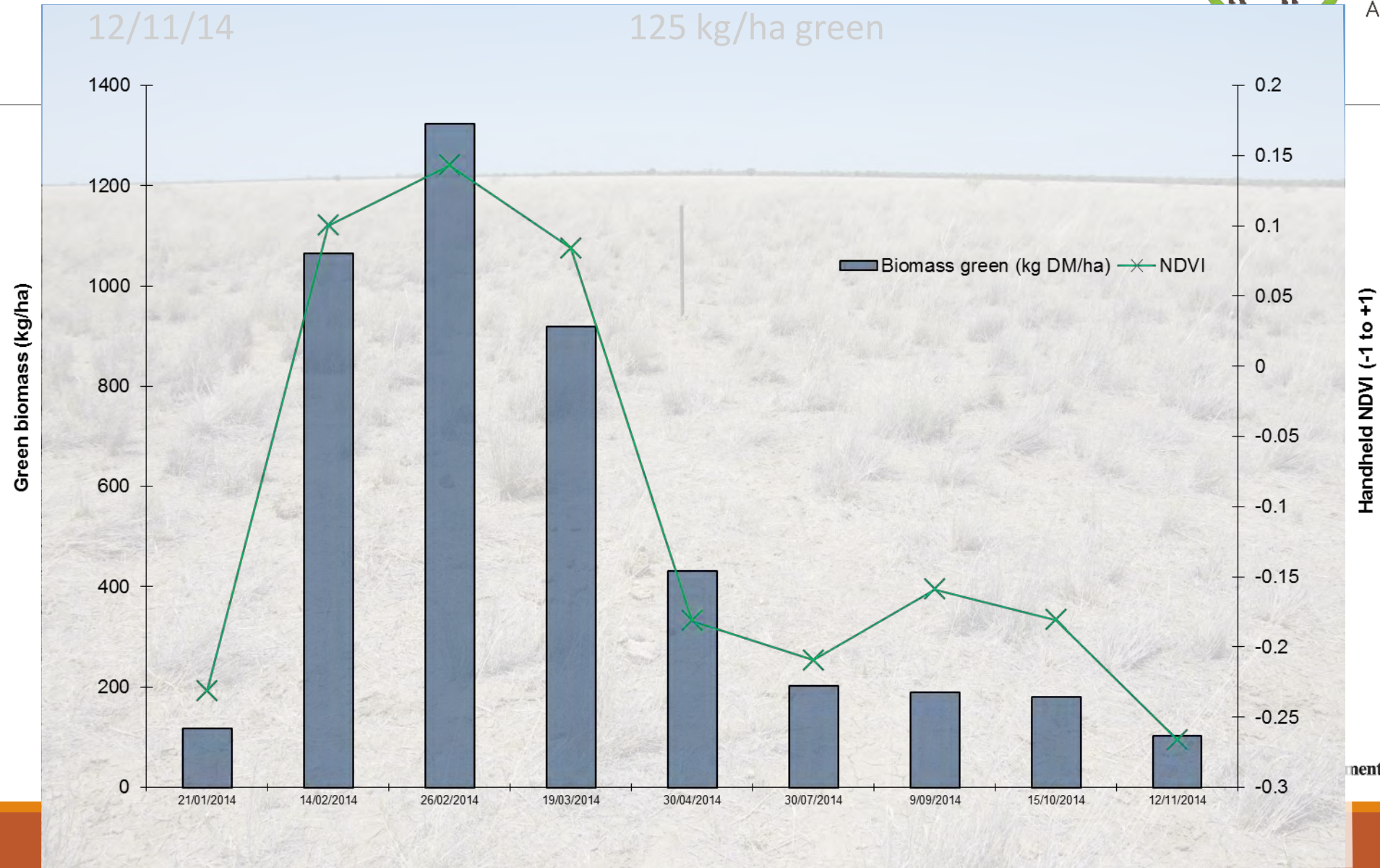
125 kg/ha green



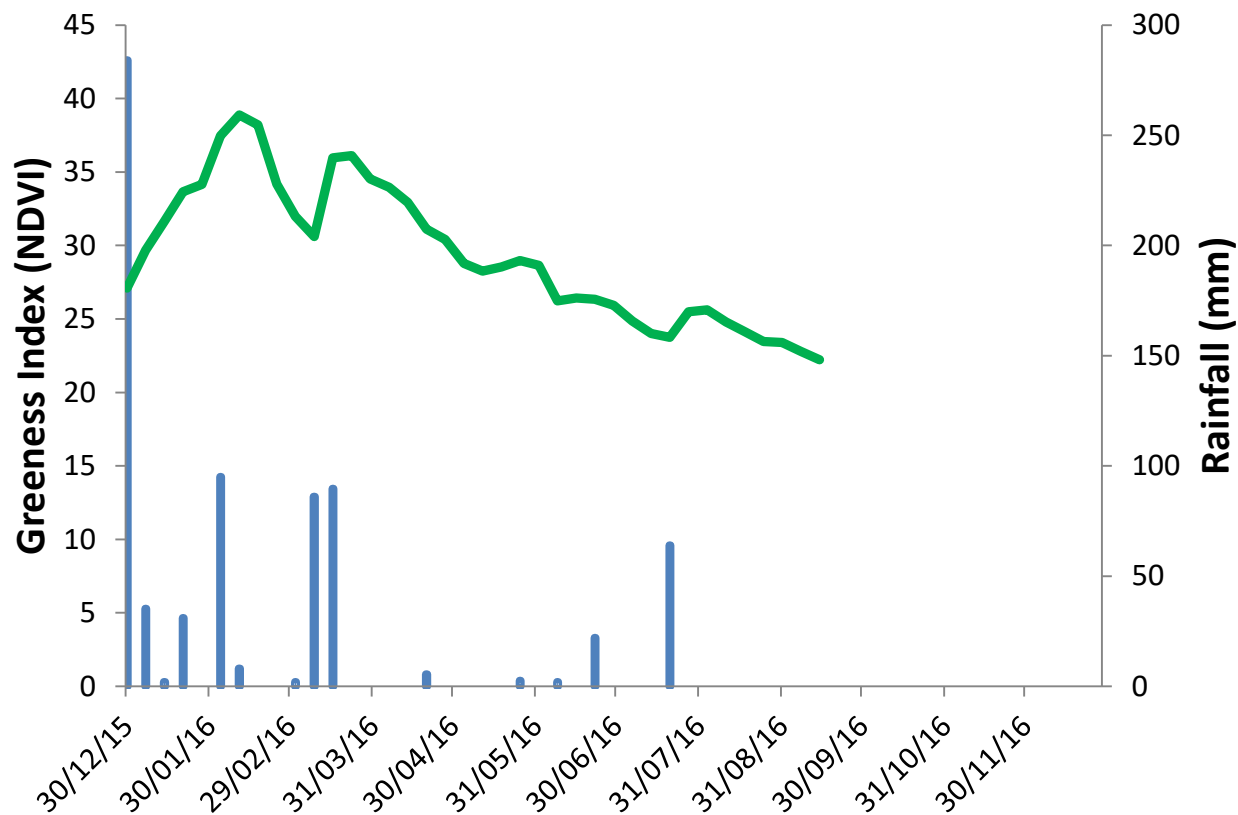
ment



Droughted - November



NDVI greenness



Can be used over time as:

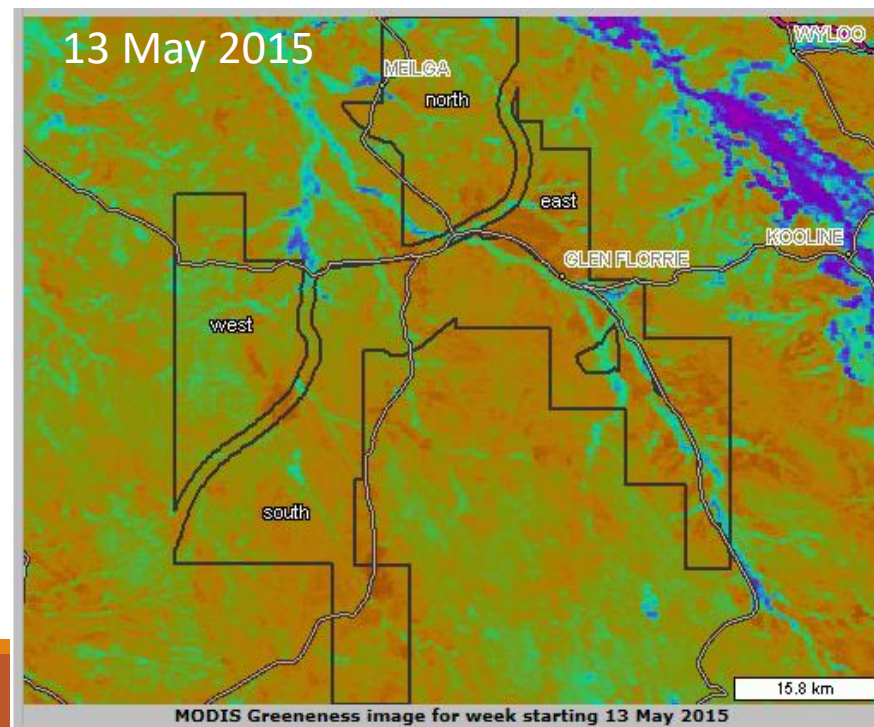
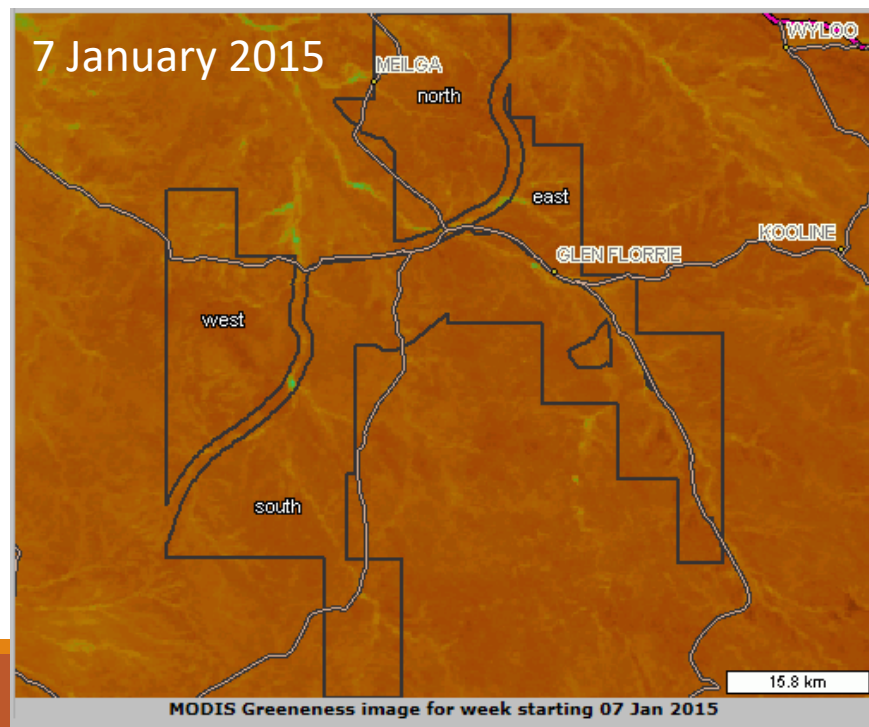
- A guide to the timing of peak pasture yield and length of the growing season
- A historical benchmark for pasture, paddock or property pasture growth
- A guide to timing restocking after wet season spelling
- A guide to the timing of pasture haying off, and associated decline in feed quality



NDVI greenness

Can be used across a paddock or property as:

- A practical guide to the response to rainfall, including all the areas not seen during a water run
- A guide of relative pasture quality within a land type or pasture
- An estimate of pasture response, helping identify areas and paddocks in need of spelling



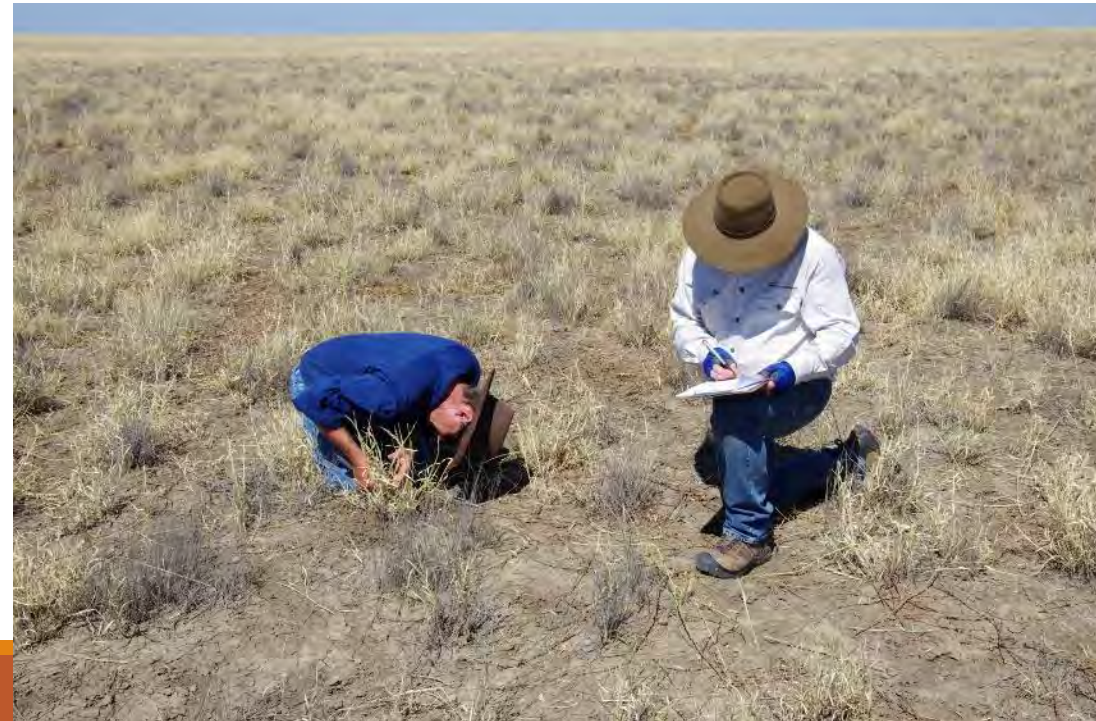
NDVI only measures green

It is important to understand that NDVI can only be used as indicator for green feed

Once the pasture hays off, the NDVI drops off – even if there is still a good bulk of dry feed

So – NDVI is very useful tool when pasture is growing, but can't tell us how much dry feed might be in a paddock from last year

You still need to get out in the pasture to check what has grown after the rain

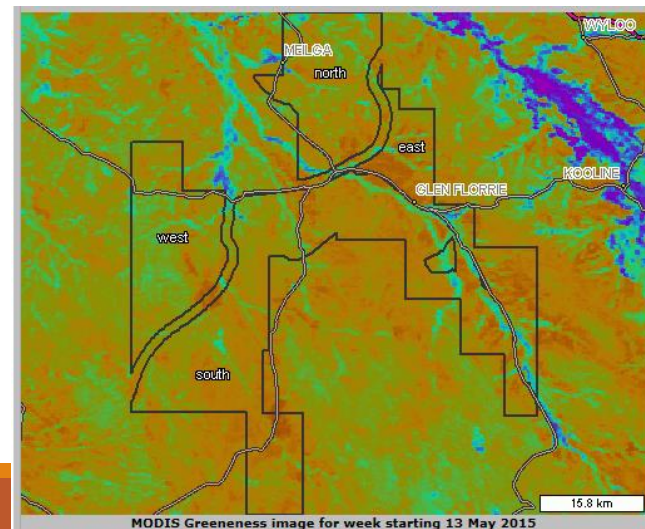


NDVI measures all green

It is important to understand that NDVI measures all the green vegetation – including trees and shrubs

This can be very useful to help look for areas of shade or woody weeds from a satellite image over the dry season

Trees and shrubs increase in NDVI over the growing season – as long as there is pasture underneath you know it will also be greening up



Linked to cattle production

When linked with cattle liveweight, NDVI becomes an objective measurement of the quality of feed on offer

It overcomes limitations, such as:

- not knowing if it is pasture or trees greening up
- not knowing if the green is weeds or good feed

Liveweight gain is the best measure that the pasture is providing a high quality diet

Liveweight flattening off (or stalling) demonstrates that quality is being lost from the feed

Liveweight loss indicates that the quality is not enough – through a lack of green feed or a lack of bulk overall



Understanding the interplay between NDVI and liveweight



Look for peaks in the NDVI

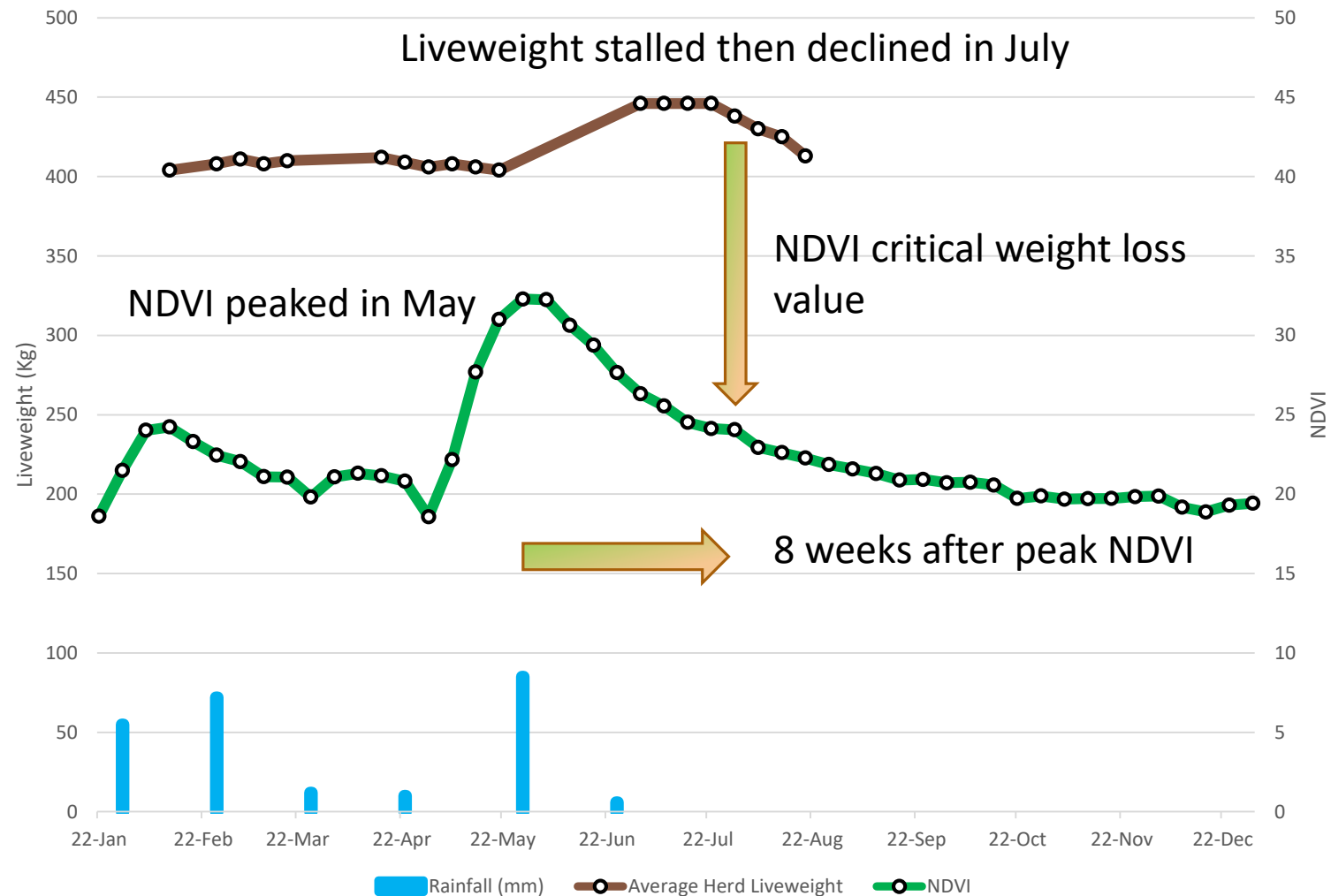
Look at how quickly the NDVI increases and decreases

Look at how long the NDVI stays high

Trace how long it takes for liveweight gain to

- start increasing
- flatten out
- start to decline

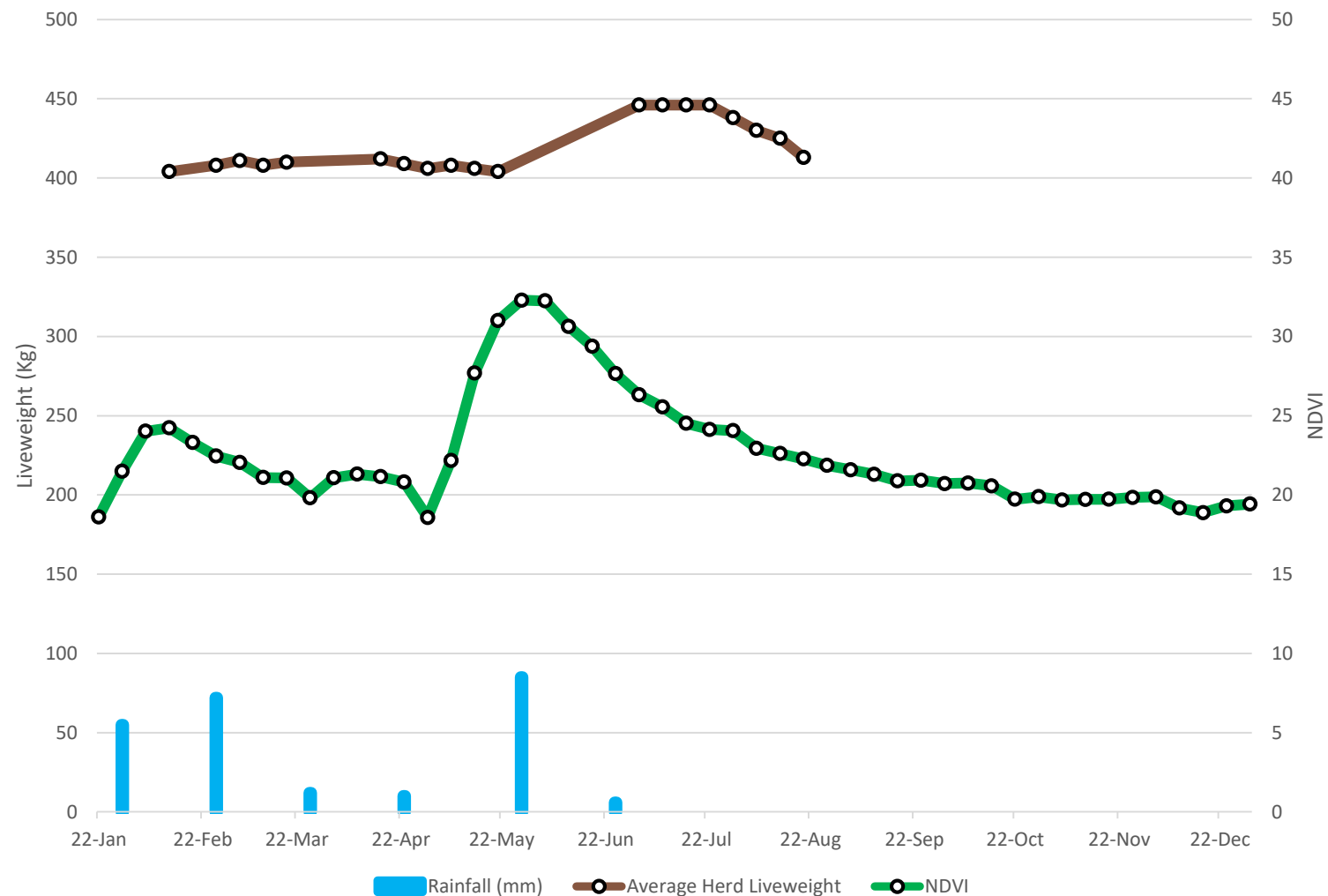
This allows you to estimate the NDVI value when cattle lose weight in that paddock



NDVI and liveweight interplay

Understanding this interplay between NDVI and liveweight, can help:

- time supplementation decisions
- anticipate realistic weight targets
- anticipate sale dates
- destocking and restocking
- choose paddocks with the best green feed
- Timing of wet season spelling



The main ideas in e-beef...

In the e-beef project, these earlier ideas are taken a step further by making it easier to see how decisions can influence pasture, cattle and business performance

Funded through Landcare, it is helping provide information for sustainable production: a healthy businesses, healthy cattle, healthy pastures and healthy soils

E-beef is also exploring how other technologies can be used to reduce costs, support decisions and improve sustainable production

Later presentations will cover some of the technologies being looked at, and the Agrihive business platform being used in the e-beef project

Other sources of satellite data are also being looked at, such as fractional cover data that is available through the Forage products that Grant Stone will cover in a later presentation



In summary

NDVI provides an objective measure of pasture response across a property, over time

Linked with cattle liveweight it becomes a powerful measure of pasture and cattle performance

Interpreting the liveweight and NDVI information together can help anticipate cattle performance for a number of weeks in advance, supporting decisions such as timing:

- Meeting market specs and sale dates
- Destocking and restocking
- Supplementation requirements
- Paddock movements
- Wet season spelling



Time for questions

