



# Draft for discussion purposes

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## Extracting NZeem-estimated sediment yield data for Agribase farm boundaries within HRWO catchments

This report was commissioned by the Technical Leaders Group for the Healthy Rivers Wai Ora Project

The Technical Leaders Group approves the release of this report to Project Partners and the Collaborative Stakeholder Group for the Healthy Rivers Wai Ora Project.

Signed by:

**Date: 1 December 2015**

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# **Extracting NZeem-estimated sediment yield data for Agribase farm boundaries within HRWO catchments**

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## Extracting NZeem-estimated sediment yield data for Agribase farm boundaries within HRWO catchments

### Tasks

1. Produce an A4 sized digital map of farms in the Waikato catchment
2. Produce a spreadsheet giving Agribase farm ID, NZeem-estimated sediment load coming from each farm, and the ID of the HRWO subcatchment to which each farm drains
3. Document methodology, data layers and assumptions used (this document)

### Methodology

#### Data layers used

1. HRWO catchment boundaries (supplied by WRC) – ESRI shapefile
2. Most recent available edition of Agribase (dated March 2014) – ESRI shapefile
3. NZ Empirical Erosion Model (NZeem) (Dymond, et al., 2010) – 15 m ERDAS Imagine raster

#### Data preparation

##### Agribase

Agribase was clipped out for the Waikato region using the outermost boundary of the HRWO\_catchments shapefile supplied by WRC.

##### NZeem

NZeem was recalibrated for the Waikato based on recent work carried out in erosion terrains also present in the Waipa catchment. For terrains present in the Waikato but not in the Waipa, default parameters were used.

The 15 m NZeem raster was resampled down to a cell resolution of 2 m prior to its intersection with the processed Agribase-HRWO catchments layer to avoid small polygons being omitted from analysis.

##### Processing

1. Intersect the clipped Agribase layer with the HRWO catchments layer. Farm boundaries frequently straddle catchment boundaries so the two layers were intersected and all relevant attributes retained so that summary statistics could be generated by farm ID and by catchment ID at any stage later on. As such, some farms will have multiple entries in the spreadsheet pertaining to the catchments to which they drain. Additionally, many farms comprise multiple but disjointed polygons under a single record; these were broken down into unique single-part polygons prior to analysis.

2. Agribase contains many cases of multiple overlapping polygons relating to incidences such as land parcels having multiple owners or being subleased, etc. In the HRWO catchments area, several hundred such errors are present in Agribase. Owing to the time required to manually remove these errors, we instead opted to rasterise the layer to the same 2 m grid as for the NZeem layer, accepting default decisions when dealing with overlaps. Cell values in the rasterised layer were generated from the unique feature ID (FID) of the input polygons.
3. Extraction of NZeem data. For each unique FID value in the rasterised intersected Agribase-HRWO layer, the mean NZeem value for sediment yield (t/km<sup>2</sup>/yr) was calculated using Zonal Statistics in ArcGIS. The output table was then joined to the Raster Attribute Table on the basis of FID. The complete table was then exported to Excel as `Export_all_for_analysis_final.xlsx`.
4. Frequency tables were generated to calculate total area and annual sediment yields (in t/yr) by Agribase farm ID and by HRWO catchment name. These were exported to Excel as `Area_and_sed_by_agribase_id.xlsx` and `Area_and_sed_by_catchment.xlsx` respectively.

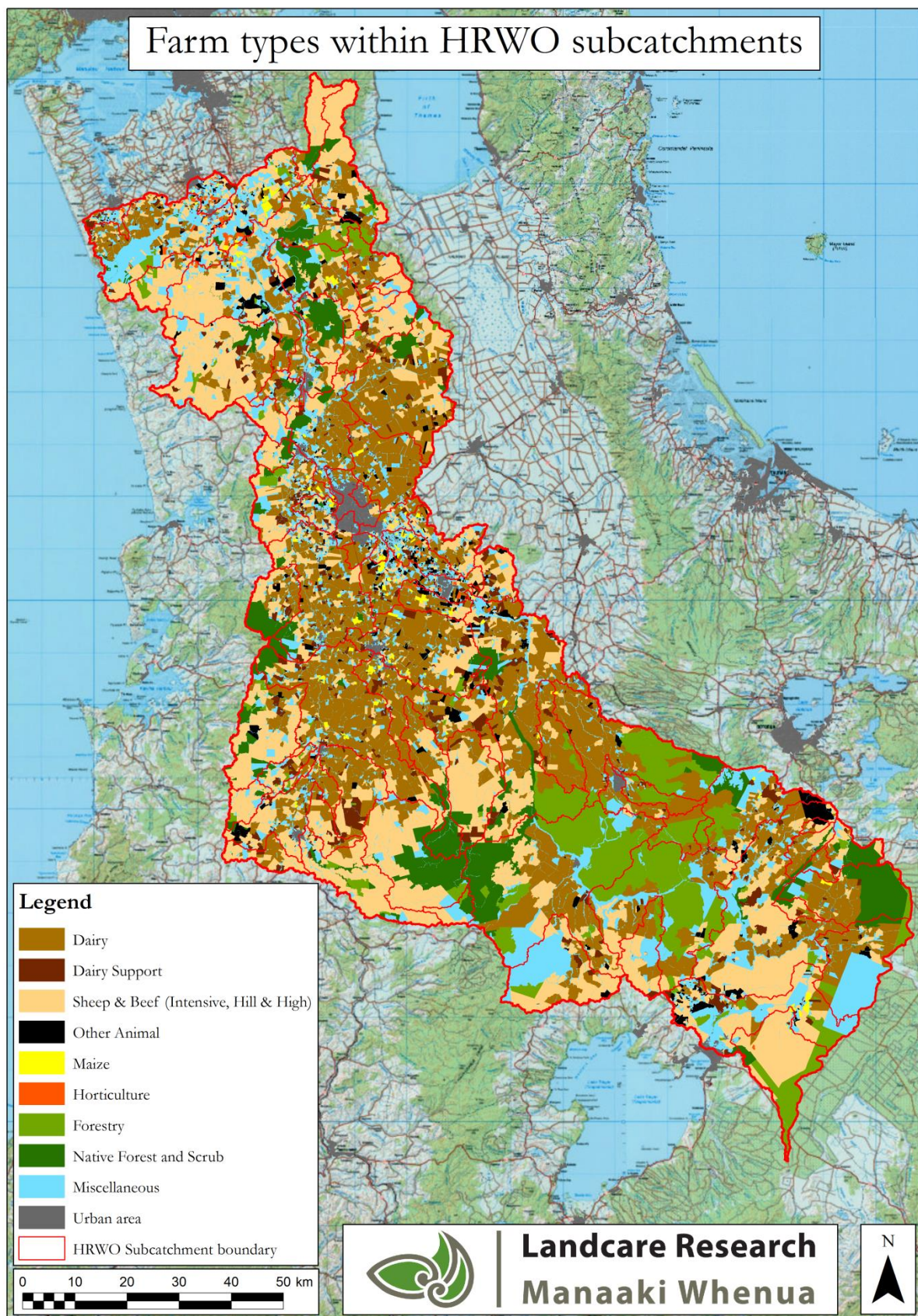
#### Production of map showing farm boundaries in the HRWO catchments

An A4-sized digital map was produced as shown below in Figure 1, using Agribase classes grouped into their equivalent HRWO 12 land use classes following consultation with WRC. Where Agribase did not contain data within the HRWO boundaries, gaps were filled as follows:

- Urban areas: As defined in the Land Cover Data base v4 (LCDB4)
- Other areas (rivers, lakes, other gaps not defined): Classed as miscellaneous.

#### Outputs

1. Three Excel spreadsheets containing NZeem-derived sediment yield data for Agribase farm boundaries in the HRWO catchments as follows:
  - `Export_all_for_analysis_final.xlsx`: Contains area (km<sup>2</sup>) and total sediment yield (t/yr) data for all rasterised polygons generated by the intersection of the HRWO layer with Agribase. This is the reference spreadsheet from which all summary statistics can be generated if required
  - `Area_and_sed_by_agribase_id.xlsx`: Summarises total area (km<sup>2</sup>) and total sediment yield (t/yr) by Agribase farm ID
  - `Area_and_sed_by_catchment.xlsx`: Summarises total area (km<sup>2</sup>) and total sediment yield (t/yr) by HRWO subcatchment
2. Digital A4 map showing farm types within the HRWO catchments, reclassified from Agribase land use classes to HRWO 12 landuse classes. See Figure 1 below.



**Figure 1.** Map showing farm types within the HRWO catchments. Farm boundaries and classification based on Agribase (March 2014) reclassified to equivalent HRWO 12 classes.

## Reference

Dymond, J.R., Betts, H.D., Schierlitz, C.S. (2010). An erosion model for evaluating land-use scenarios in New Zealand. *Environmental Modelling and Software* 25: 289-298.