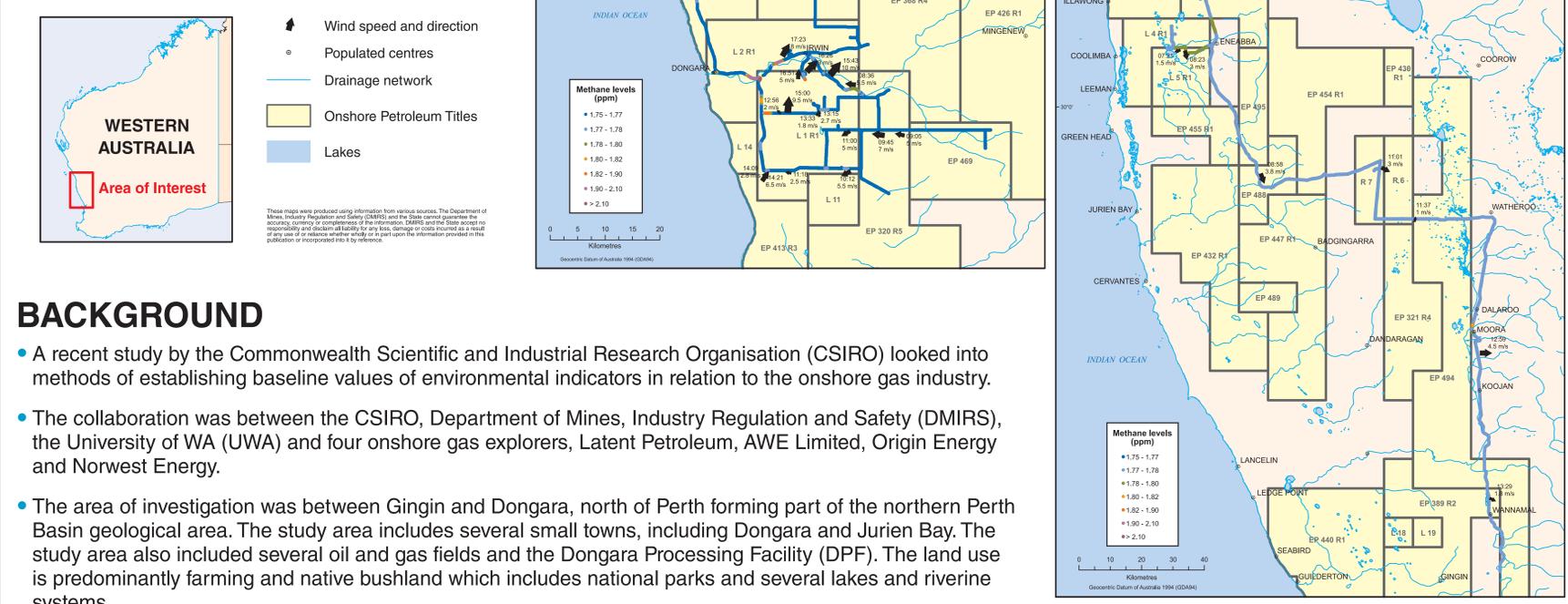
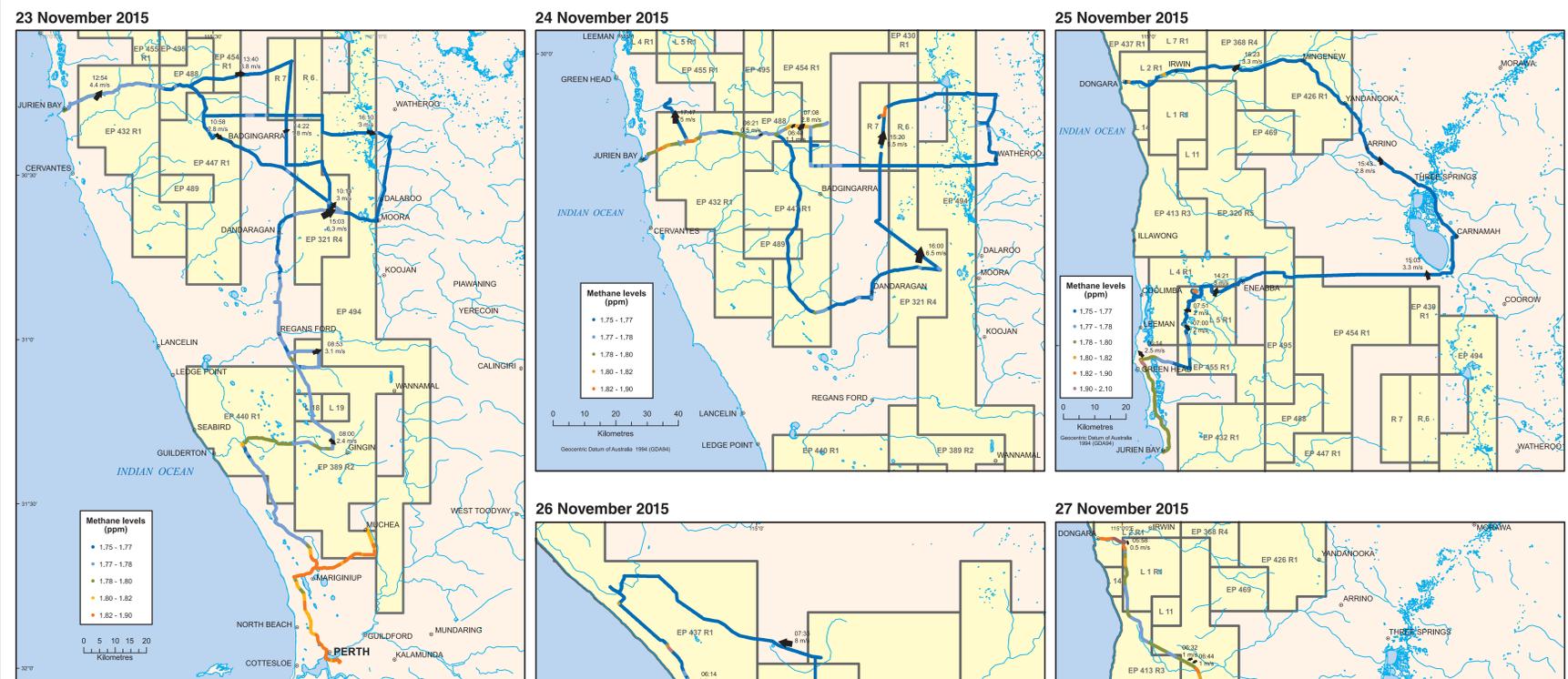


BASELINE METHANE STUDY

Northern Perth Basin



BACKGROUND

- A recent study by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) looked into methods of establishing baseline values of environmental indicators in relation to the onshore gas industry.
- The collaboration was between the CSIRO, Department of Mines, Industry Regulation and Safety (DMIRS), the University of WA (UWA) and four onshore gas explorers, Latent Petroleum, AWE Limited, Origin Energy and Norwest Energy.
- The area of investigation was between Gingin and Dongara, north of Perth forming part of the northern Perth Basin geological area. The study area includes several small towns, including Dongara and Jurien Bay. The study area also included several oil and gas fields and the Dongara Processing Facility (DPF). The land use is predominantly farming and native bushland which includes national parks and several lakes and riverine systems.
- Studies carried out during 2015 and 2016 included a snapshot of atmospheric methane measurements, soil gas (methane) flux around the Warro gasfield, and an assessment of groundwater levels and chemistry of the key aquifers.

ATMOSPHERIC METHANE STUDIES

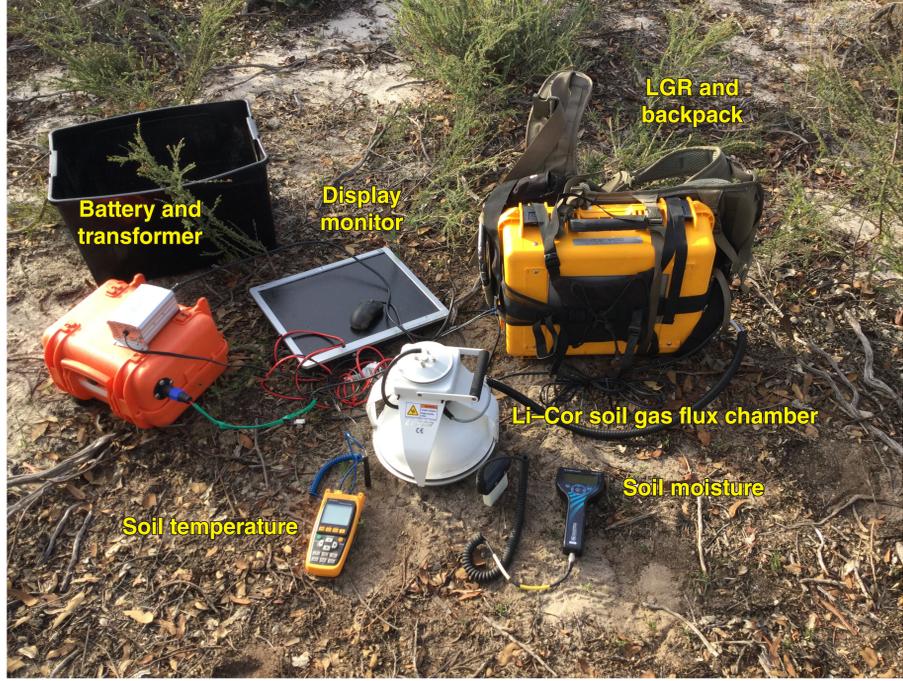
- Atmospheric methane surveys covering approximately 2300 km, found the mean methane concentration of 1.77 parts per million (ppm). This methane level is similar to the latest greenhouse gas data from one of the cleanest air sources in the world at Cape Grim in Tasmania available at www.csiro.au/greenhouse-gases
- Higher concentrations of atmospheric methane (up to 4.5 ppm) were measured downwind of the Dongara Processing Facility (DPF) in the morning. By afternoon methane levels had returned to background levels.
- Atmospheric methane concentrations near petroleum well sites in the study area were consistent with background levels.
- Atmospheric methane concentrations recorded across the region were too low to carry out any isotopic analysis to investigate the sources of methane.

SOIL METHANE STUDIES

- Soil methane flux surveys were carried out at 40 sites around the Warro gasfield, which included sites near hydraulically stimulated wells and control sites at a distance from petroleum sites.
- Two sets of surveys were conducted at the Warro field sites, neither of which detected any anomalous soil methane flux. Future surveys may include a larger area across the northern Perth Basin.
- The data indicated the flux was being controlled by microbial action. Additional sampling and modelling is recommended.

RECOMMENDATIONS INCLUDE:

- modelling atmospheric methane on a landscape scale at selected locations to investigate the sources of ambient methane
- further studies on impacts of the different methane sources such as facilities, towns, lakes, petroleum wells and cattle on the atmospheric methane concentrations
- long-term monitoring of soil gas flux rates to understand seasonal variations



Soil gas flux measuring equipment



Vehicle set up for mobile survey showing the intake point attached to the antenna of the vehicle.