Dark and Quiet Skies in Australia

Mitigating the Impacts of Terrestrial ALAN and RFI



Australian Government

Department of Industry, Science, Energy and Resources

Energy and Resources

Fred Watson AM

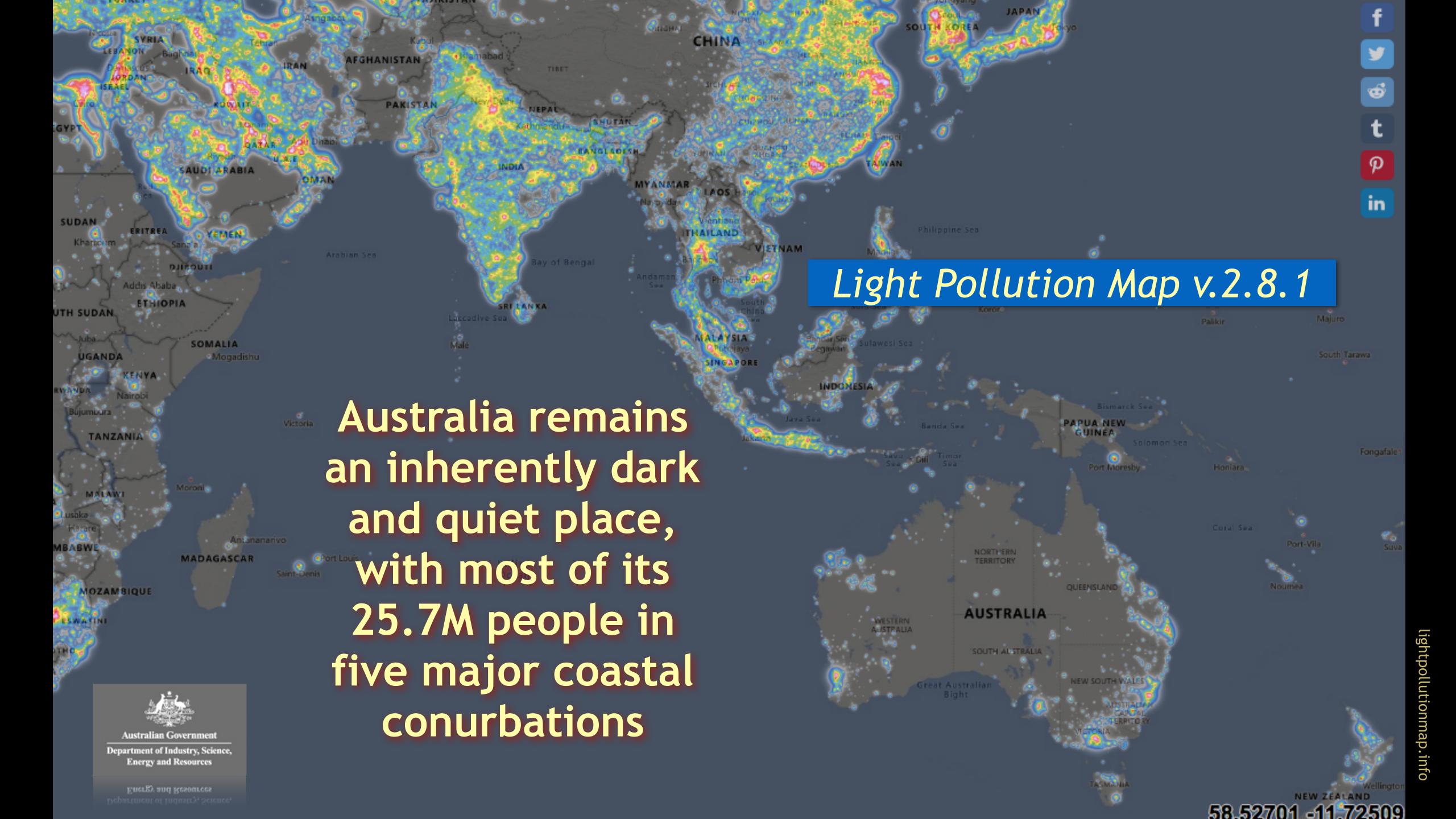
Astronomer-at-Large Department of Industry, Science, Energy and Resources

Science, Energy and Resources

COPUOS STSC

Technical Presentation 59th Session 15 Feb 2022

15 Feb 2022



Australia's vantage point on the Universe...

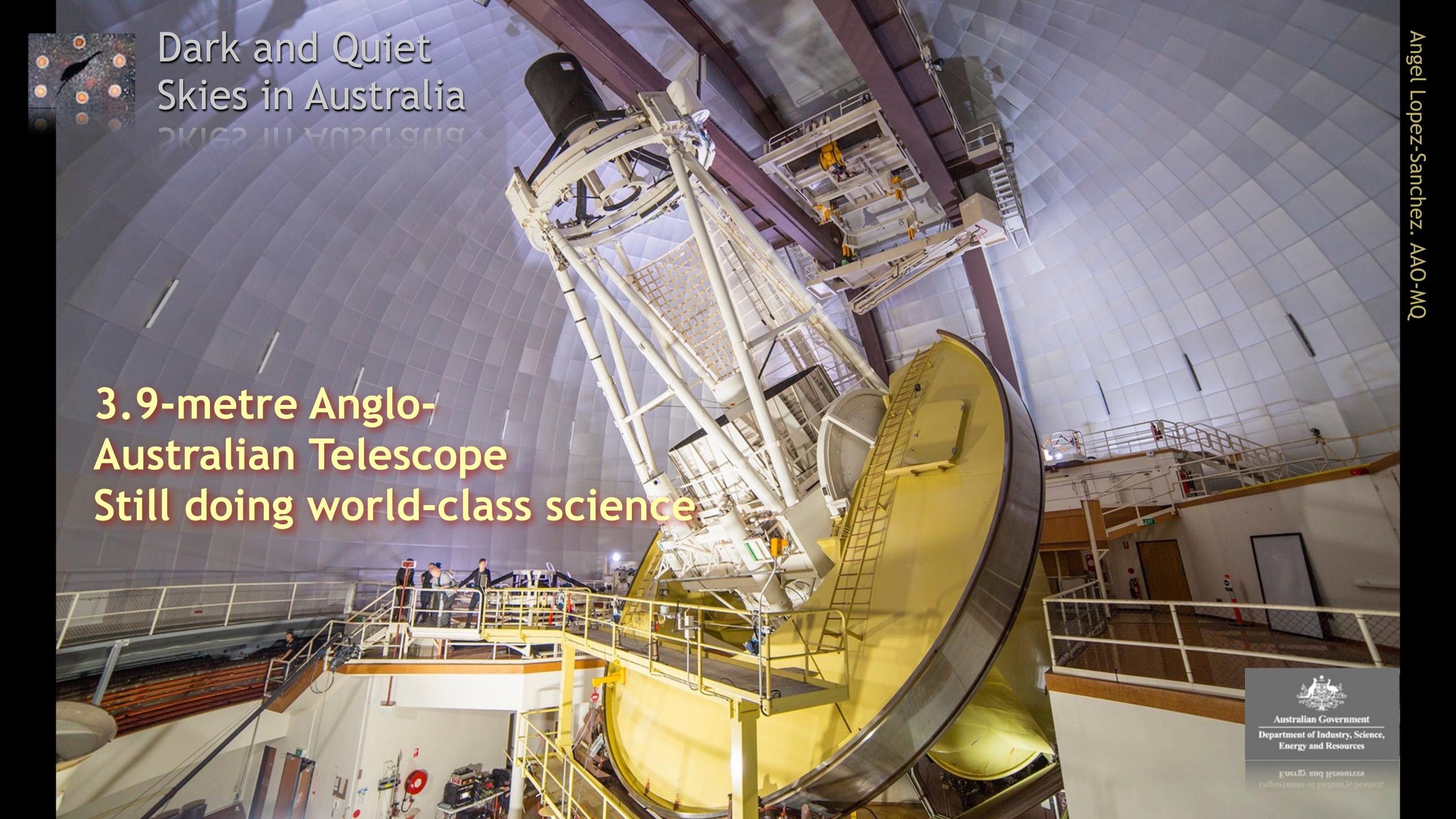
- Latitude advantage important objects
- Longitude advantage fills the southern gap
- Stable atmospheric conditions
- Dark skies
 - One of the most radio-quiet sites on Earth











Pristine darkness under threat...





Northern (upper) and southern (lower) horizons from Siding Spring (Imagery David Malin/Fred Watson)



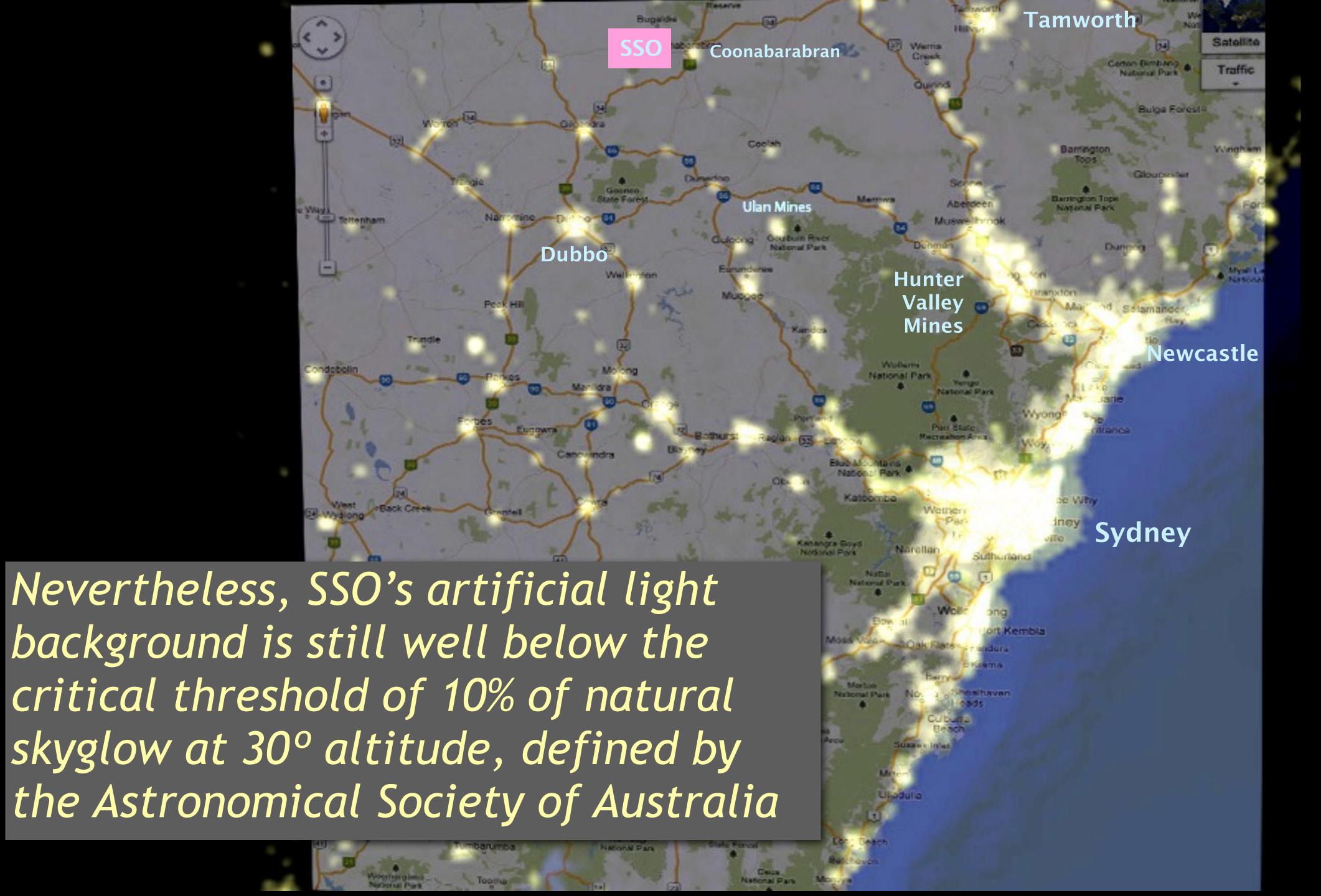
Pristine darkness under threat...





Northern (upper) and southern (lower) horizons from Siding Spring (Imagery David Malin/Fred Watson)



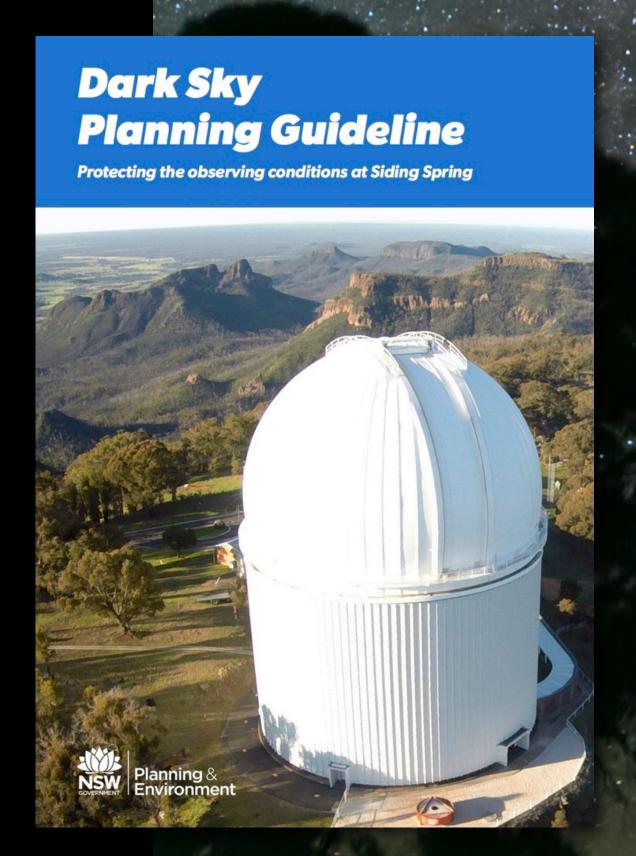






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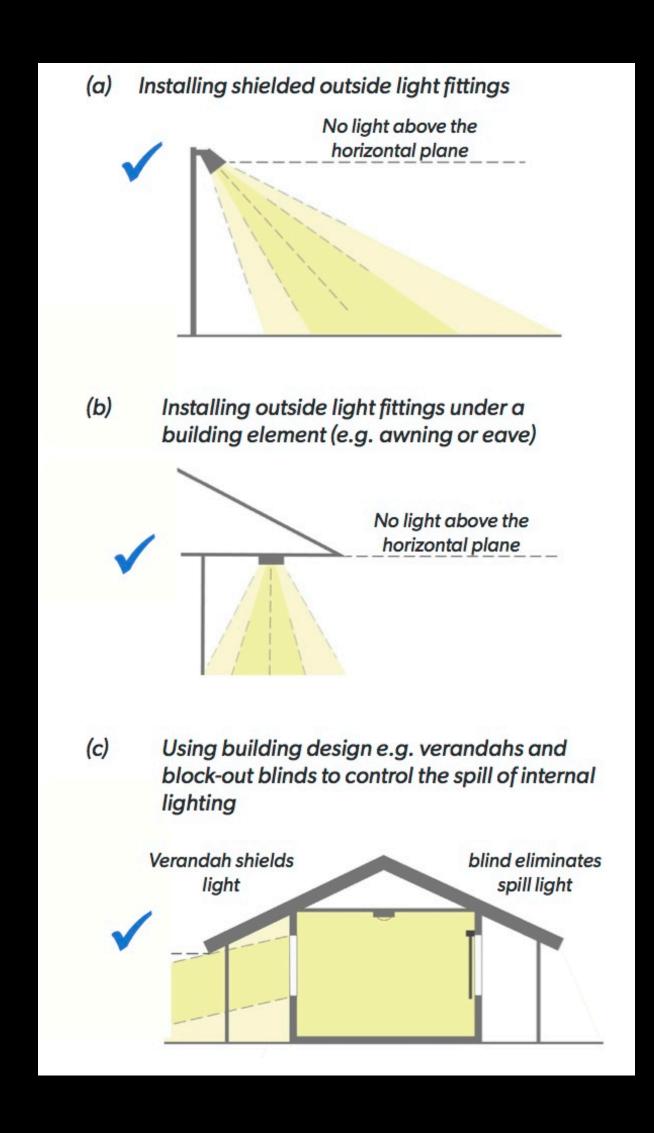
Dark sky legislation

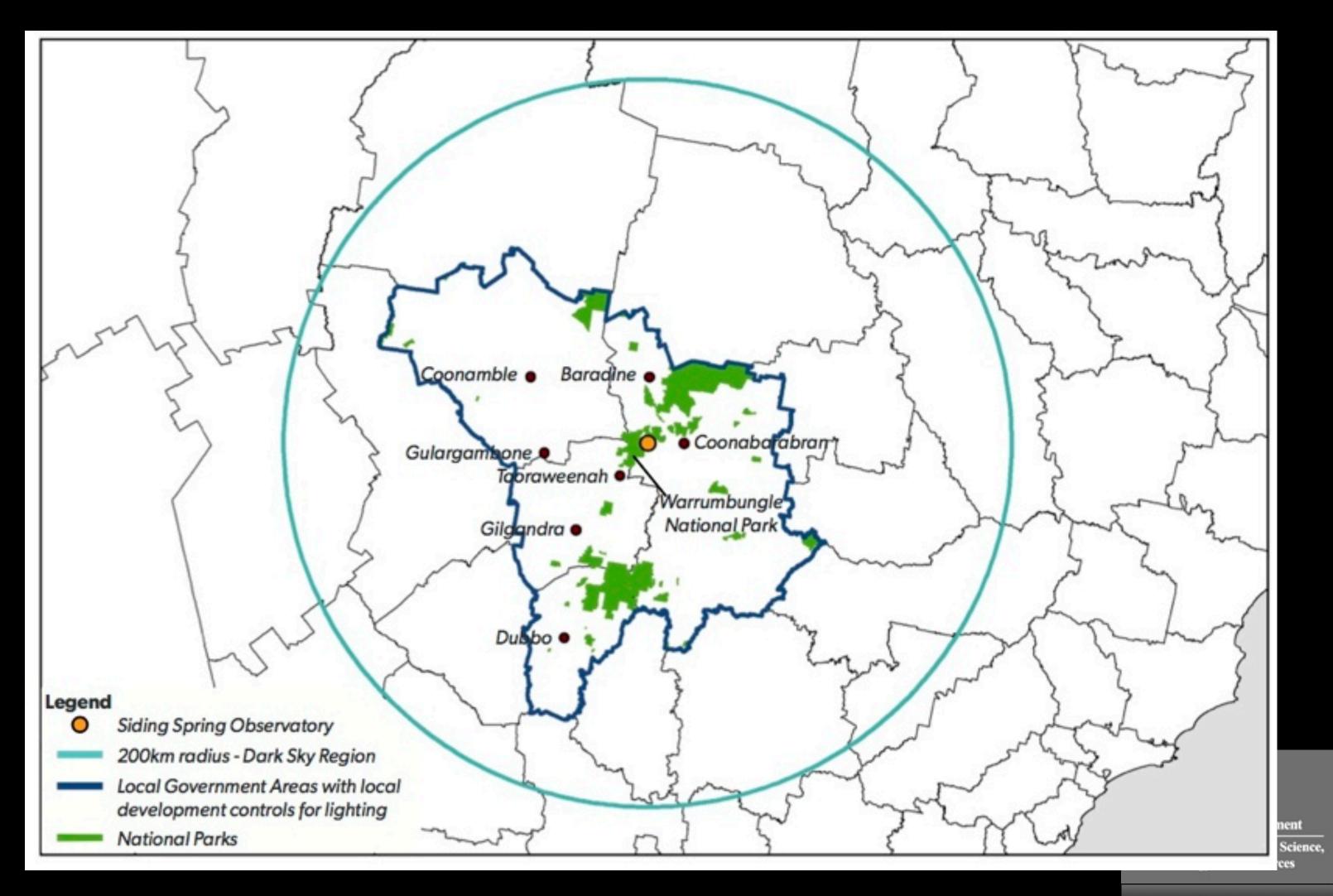


- Initial legislation introduced in 1990 hard to enforce and eventually obsolete
- New Planning Regulations introduced in 2016 mandate the NSW Dark Sky Planning Guideline be followed for all development within 100 km of Siding Spring Observatory.
- And for State Significant Developments (e.g. gas wells, coal mines) within 200 km



The Guideline presents user-friendly good lighting principles for the 400km-diameter Dark Sky Region - backed by NSW state legislation







Dark and Quiet Skies in Australia

Australia-wide safeguards





Light Pollution Guidelines

National Light Pollution Guidelines for Wildlife

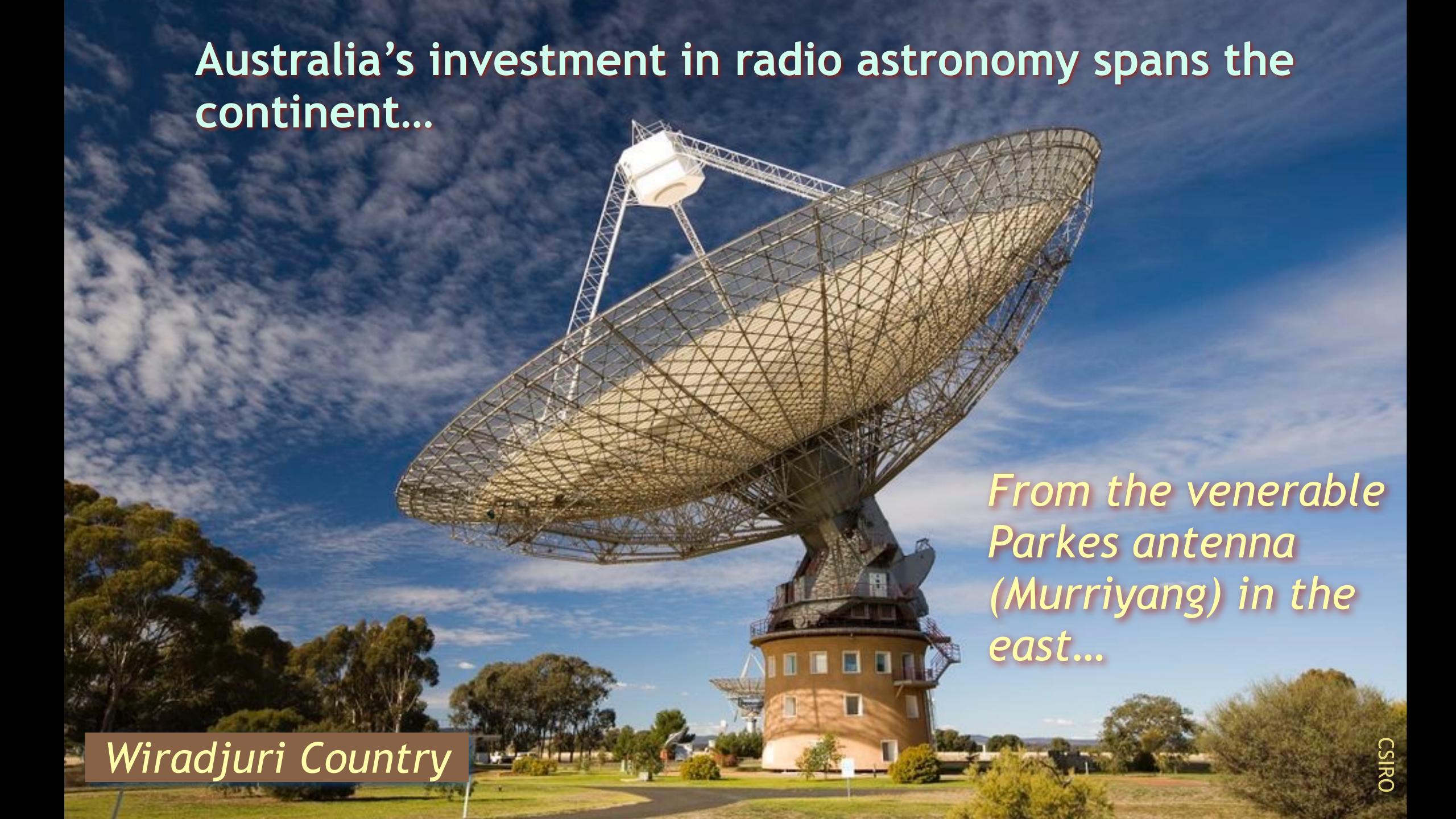
Including marine turtles, seabirds and migratory shorebirds

January 202

Version 1.0

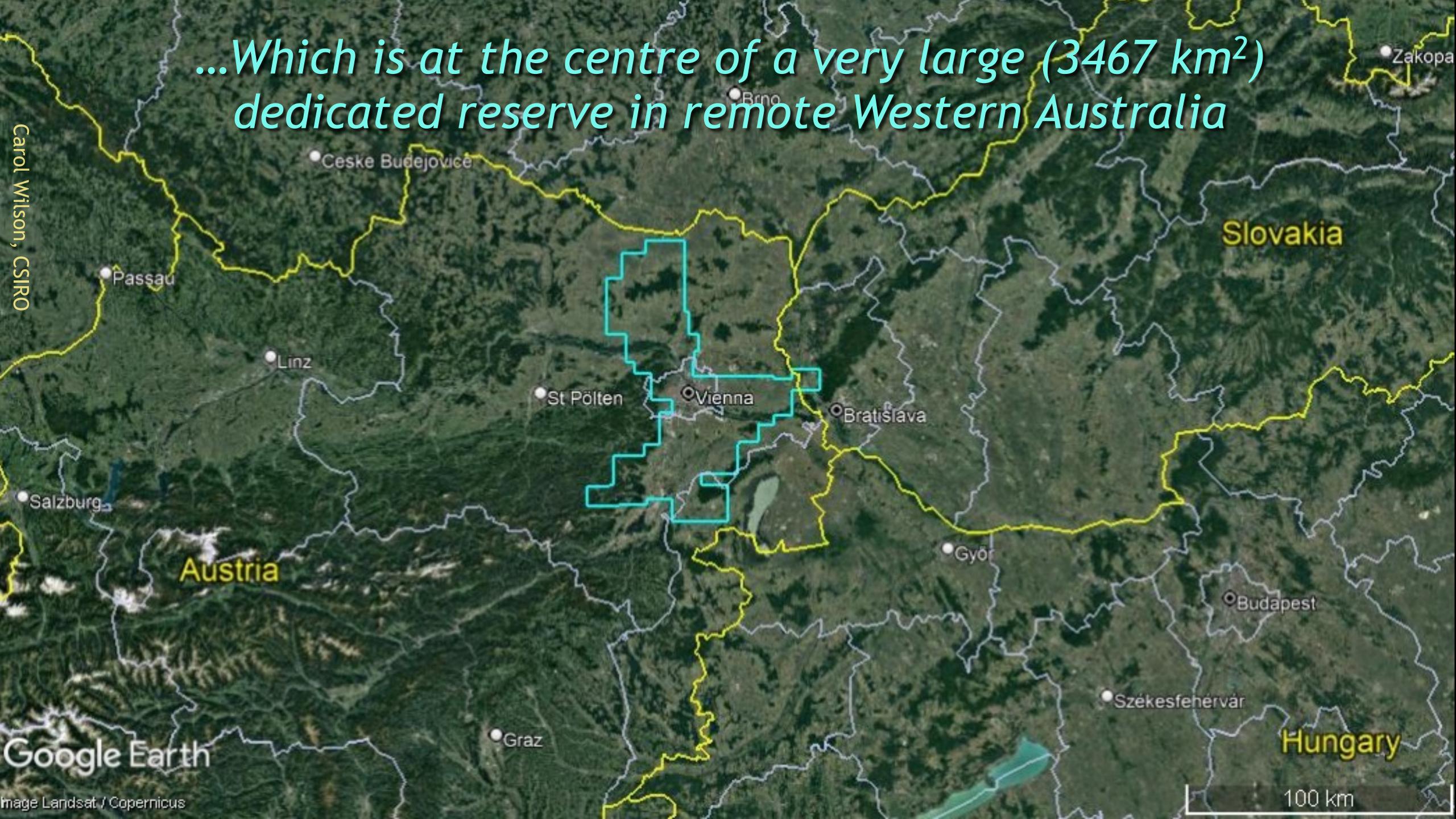


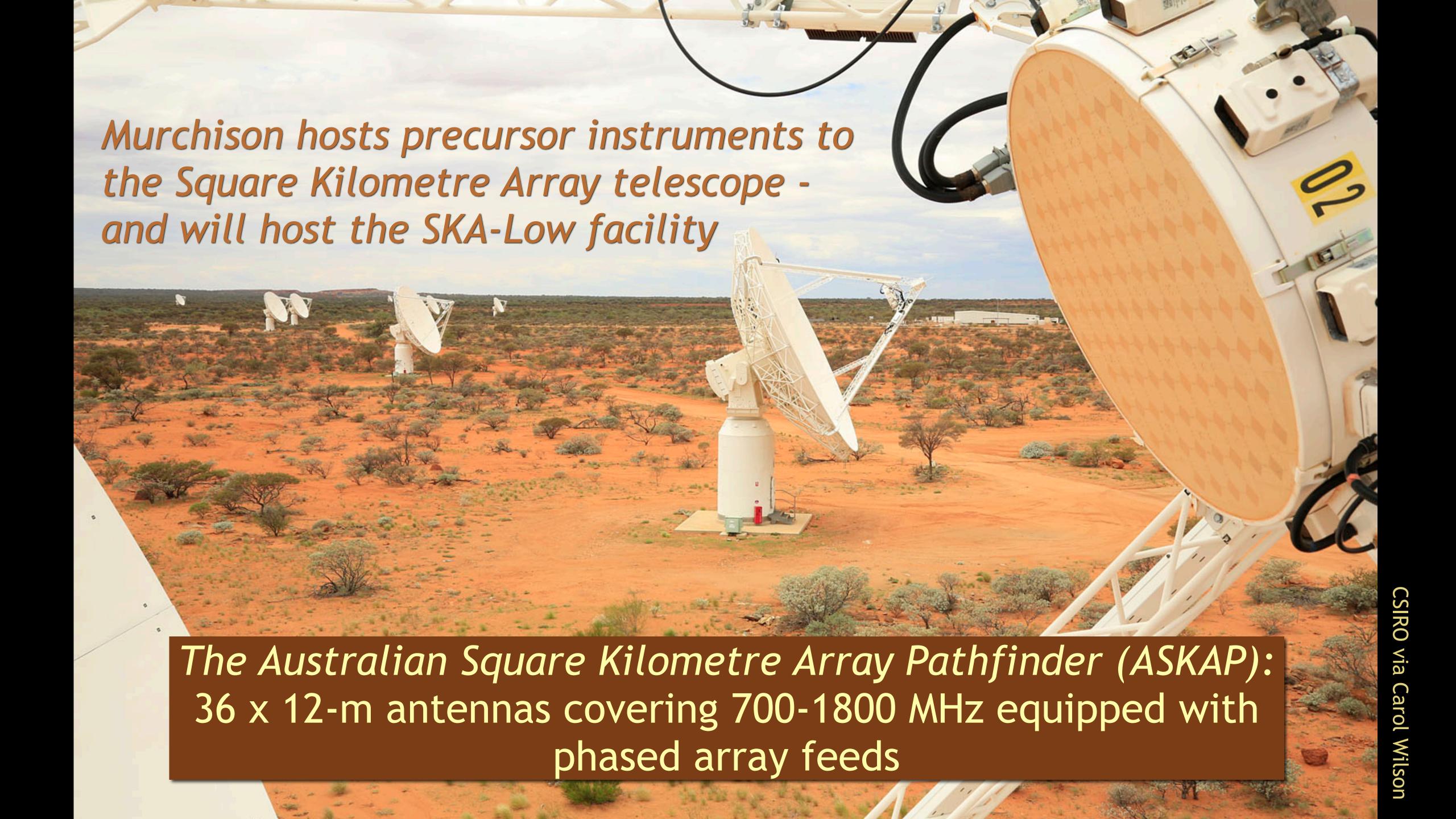
- National Light Pollution Guidelines for Wildlife
- National lighting standards: AS4282 controlling obtrusive lighting; AS/NZS1158 controlling lighting of roads and public spaces
- Advocacy and education by the Australasian Dark Sky Alliance
- Public interest in Australia's three IDA Dark Sky Places, of which the first was the Warrumbungle Dark Sky Park (2016)



Australia's investment in radio astronomy spans the continent...



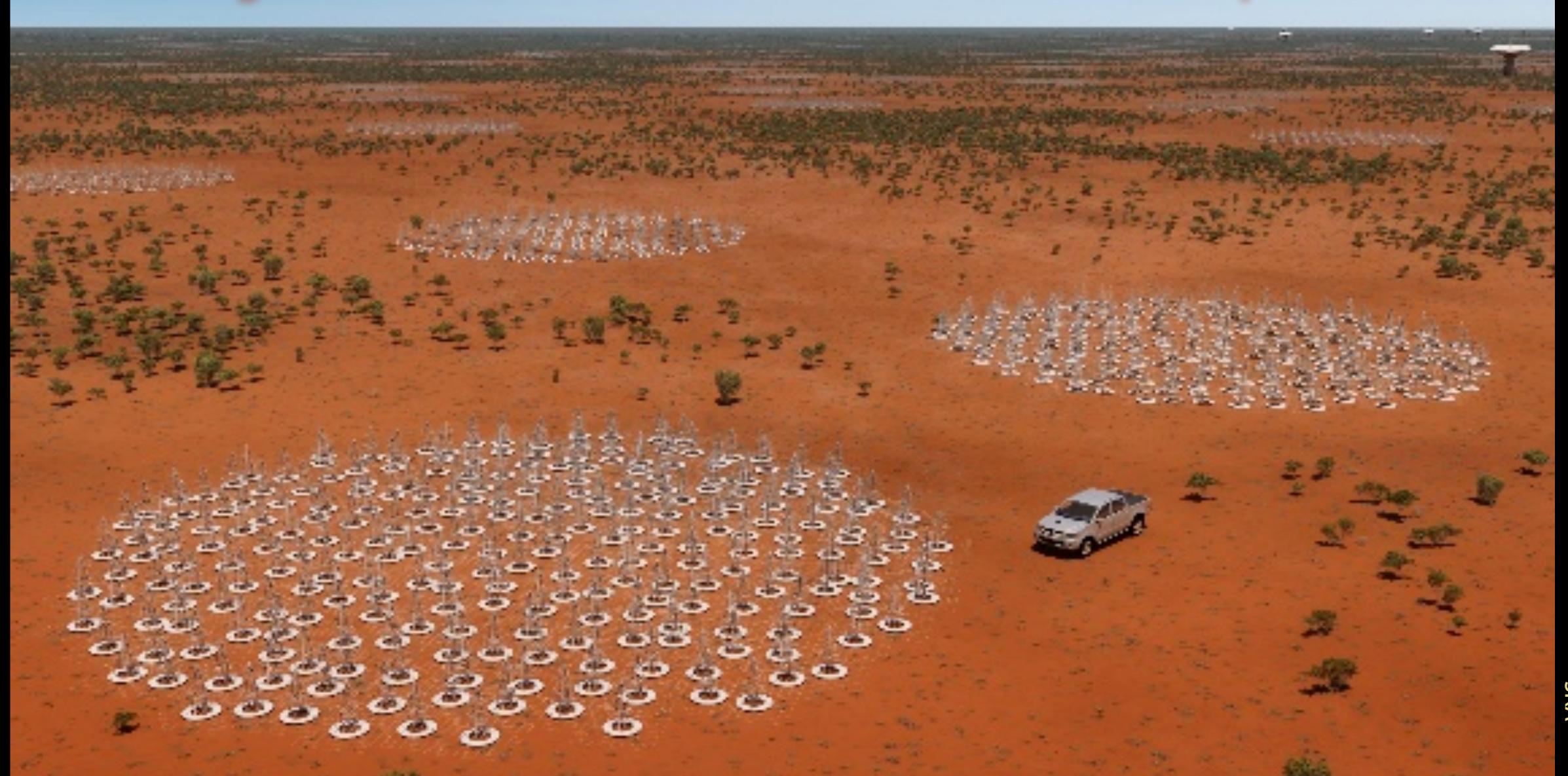




SKA is a global collaboration, with 16 nations contributing to the SKA Observatory (SKAO), formally launched in February 2021



SKA-Low will have 131,072 'Christmas tree' dipole antennas covering 50 - 350 MHz distributed over distances of up to 65 km



Construction is imminent...

How are all these front-rank radio-astronomy assets protected from RFI?





RFI Protection - Eastern Facilities...

- Covered by Notification Zones defined by the Australian Communications and Media Authority (ACMA) under Radio Assignment and Licensing Instruction (RALI) MS 31
- Up to 250 km in radius, depending on observatory site and broadcast frequency





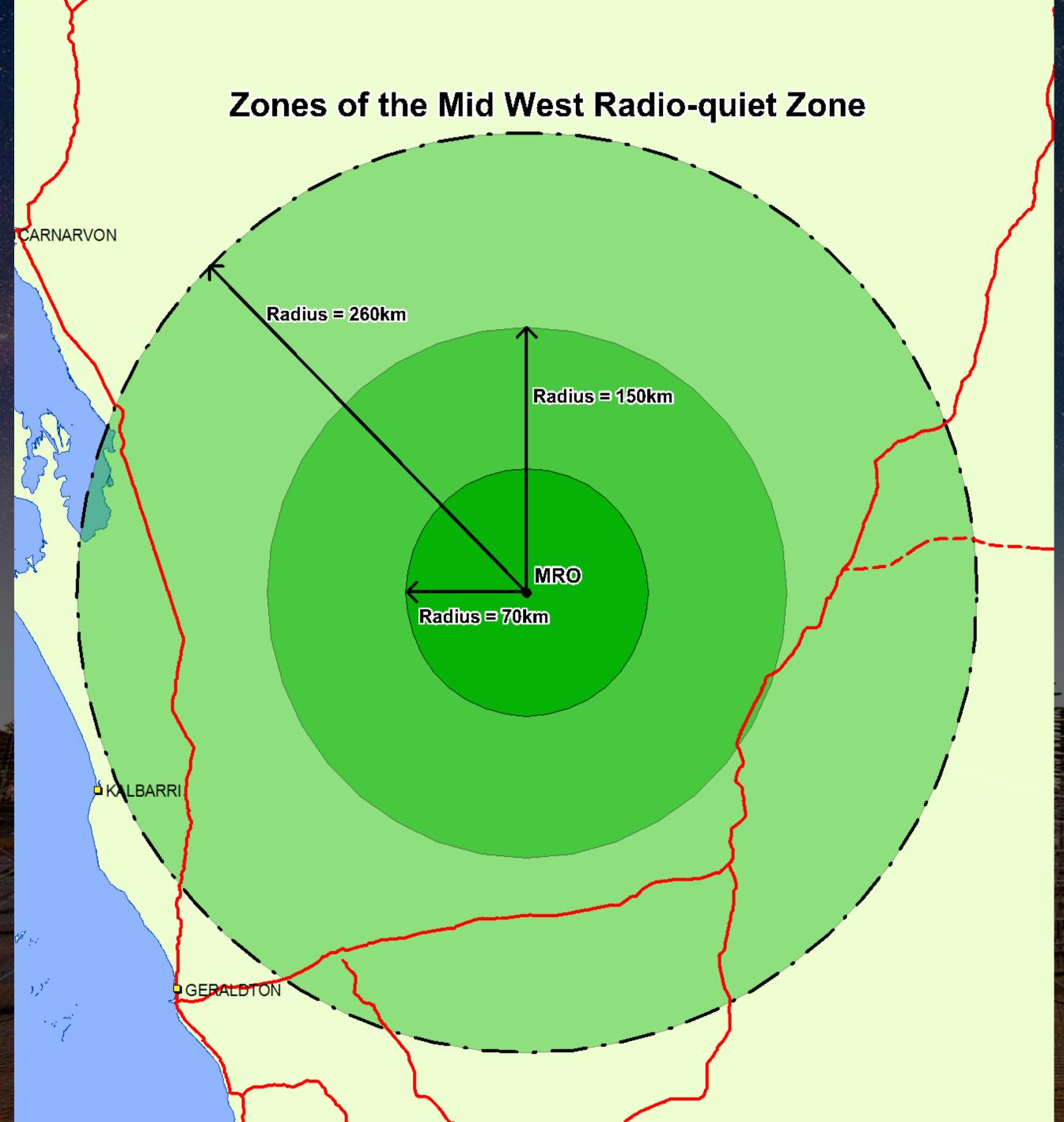
Radio quietness of the site is protected by...

Commonwealth government

- Australian Communications and Media Authority (ACMA) regulation Australian Radio Quiet Zone WA (ARQZWA) Band Plan Radio Assignment and Licensing Instruction (RALI) MS 32 Conditions on spectrum licences Class licence conditions
- Possible airspace regulations (under development)

Western Australian government Section 19 areas (no new mining tenements) Dept of MIRS Mineral Resource Management Area

Murchison Shire local planning scheme CSIRO's own policies on site With support of Mid-West Development Commission, WA Gov't, DISER





consultation required under ACMA

CSIRO

Reference material



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https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/dark-skyplanning-guideline-2016-06.pdf

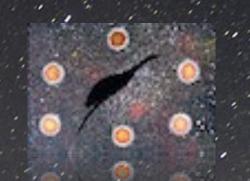
https://www.awe.gov.au/sites/default/files/documents/national-lightpollution-guidelines-wildlife.pdf

https://www.australasiandarkskyalliance.org/

https://www.industry.gov.au/policies-and-initiatives/co-hosting-the-skatelescope/the-australian-radio-quiet-zone-wa



But then there's this...



Dark and Quiet

Skies in Australia

Australia's position on dark and quiet skies...

Australia has both a growing civil space industry sector, and strong research capabilities in astronomy, supported by world-class infrastructure.

Australia continues to be supportive of discussions that bring together stakeholders in the spirit of collaboration to develop practical solutions that seek to address unintended impacts of satellite constellations on astronomy.

nanks everyone

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