

Collection of Wild Sunflowers from the Land Down Under

Gerald J. Seiler¹, Tom Gulya¹, Gary Kong²,
Sue Thompson², and Jeff Mitchell²

¹USDA-ARS, Northern Crop Science Lab., Fargo, ND


²Queensland Dept. Primary Industries, Toowoomba, QLD



Why collect wild sunflowers in Australia?

- Naturalized populations from a different continent
- Largest diversity of rust pathotypes in the world--Currently over 100
- Termination of a major sunflower research program--Dr. Gary Kong's
- Wild sunflowers considered non-native species with no restrictions on use or distribution
- Genetic studies of naturalized populations to study their center of origin and domestication genes

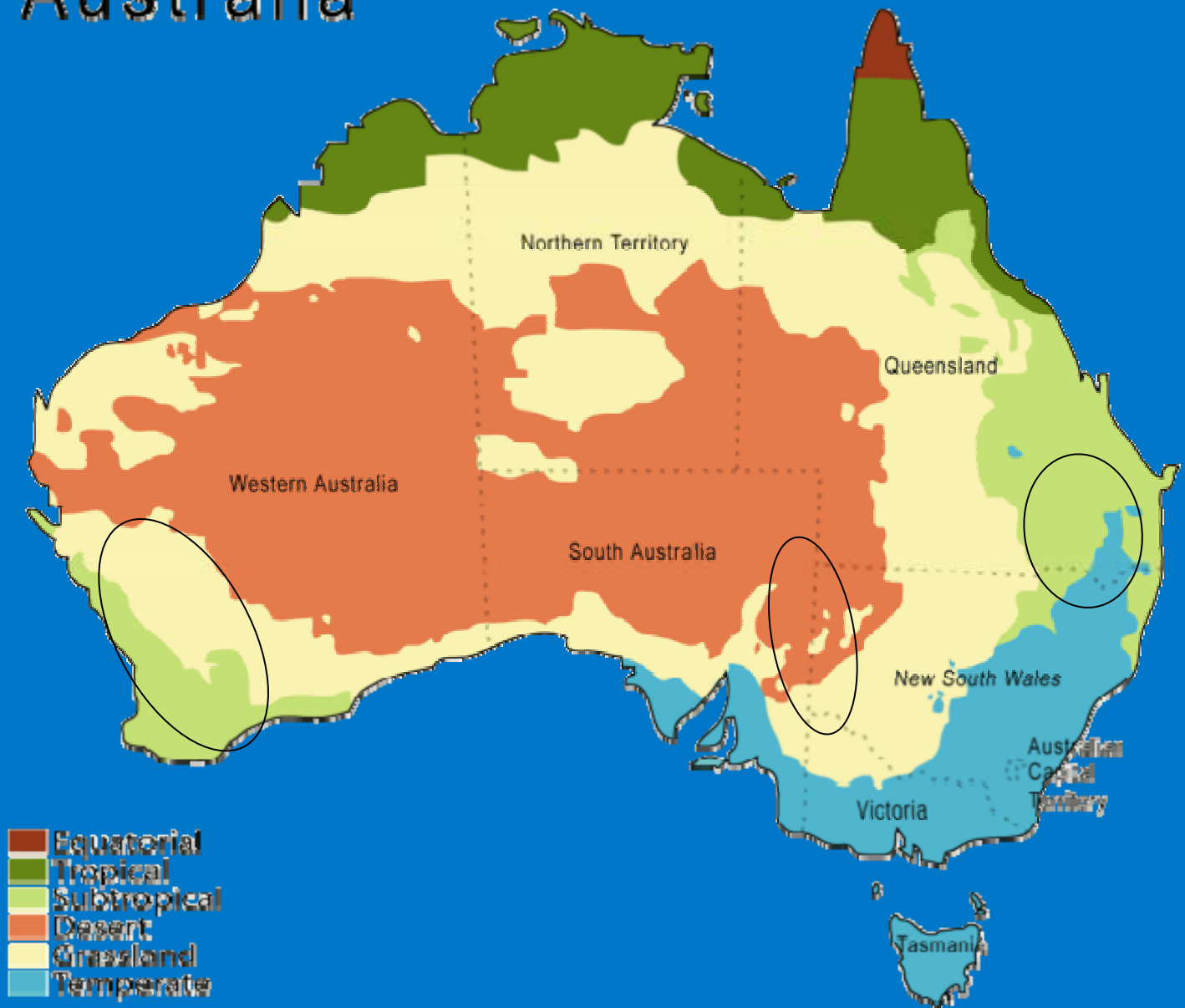
How did wild sunflowers get to Australia?

- Grown as an ornamental
 - Introduced as a weed in imported forage?
 - Introduced through the bird seed trade?
 - Wild sunflowers have been present for over 80 years
- 
- The bottom right portion of the slide features a decorative graphic of several concentric, light blue circles resembling ripples on water, set against the dark blue background.

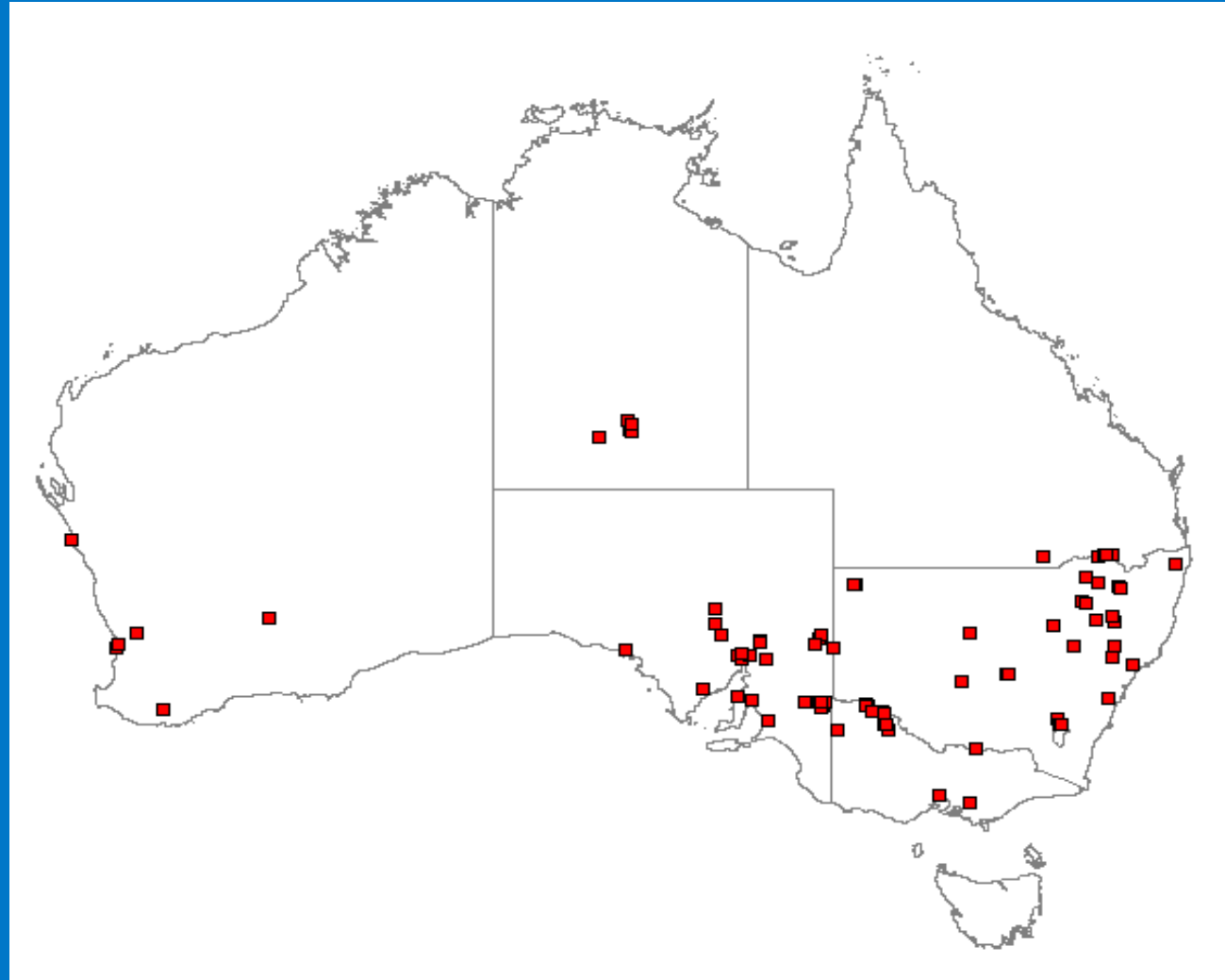
Exploration Details

- February 22 to March 14, 2007
(Mid to late summer, extremely dry)
- Two exploration teams collecting in WA, SA, NSW, VIC, and QLD
- Wild species of interest, *H. annuus* and *H. debilis*

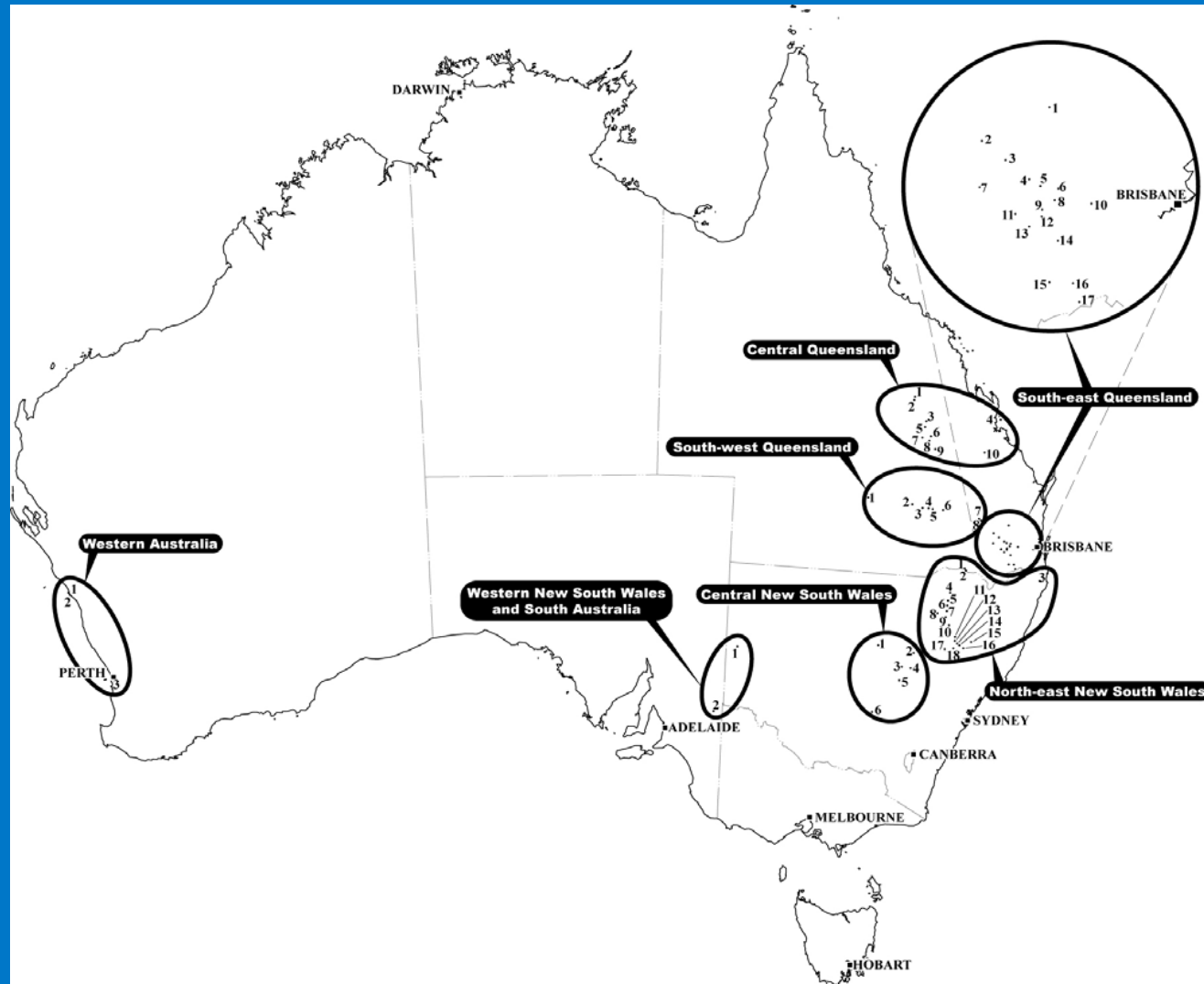
Australia

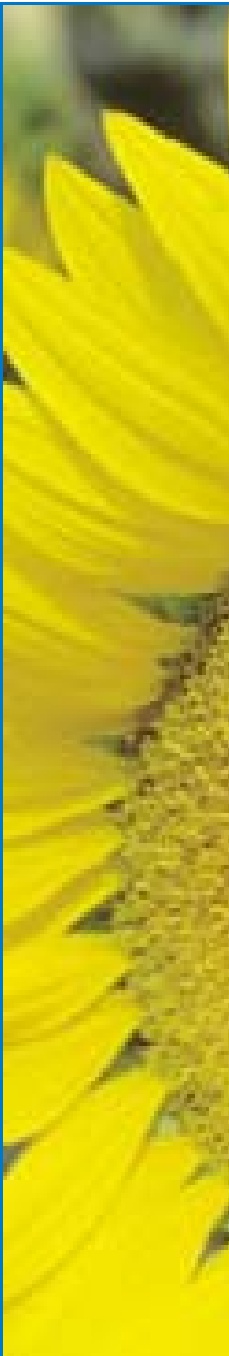


Distribution of *Helianthus* species within Australia, based on herbarium specimens collected from 1965 to present.



Map of Australia showing locations where Dr. Gary Kong and coworkers have collected rust from wild *Helianthus annuus* (2004-2006)





West Australia

WYLIE BAY RD

RUBBISH TIP

NO THROUGH ROAD





WAS-1-- Esperance



WAS-1-- Esperance



WAS-2-- Esperance



WAN-1 Lancelin



WAN-2-- Lancelin



WAN-4 -- Port Denison

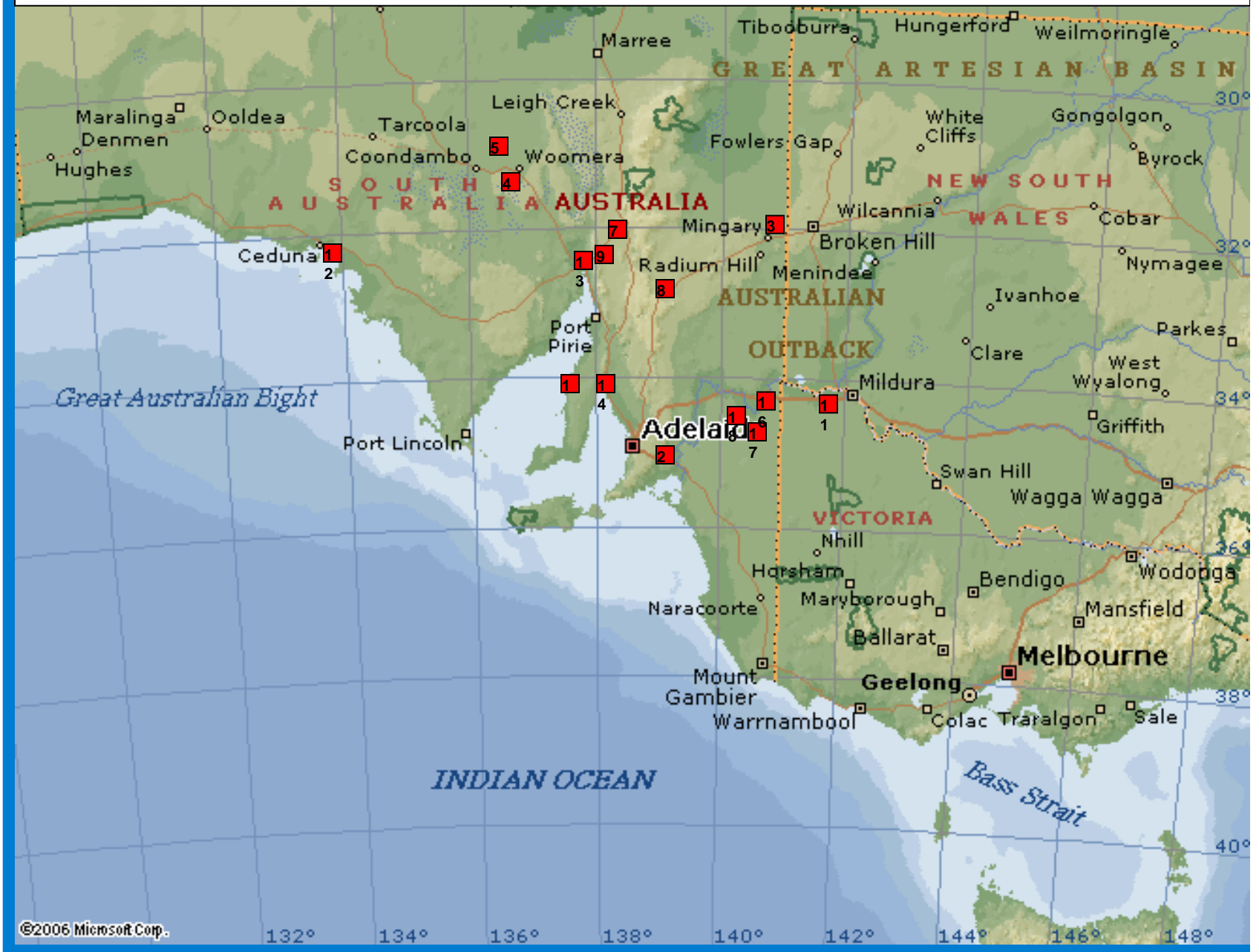


WAN-8 -- Geraldton



WAN-10 -- Kalbarri

South Australia, New South Wales and Victoria





SAE-1 – Loxton, SA



SAE-1 – Loxton, SA



SAE-1 – Loxton, SA



SAE-3 – Berri, SA



SAE-4 – Monash, SA



SAE-4 - Monash, SA



SAE-6 -- Mildura, VIC



SAE-7 -- Red Cliffs, NSW



SAE-12- Cockburn, SA



SAE-13 – Hawker, SA



SAW-1-- Port Augusta, SA



SAW-3 -Port Augusta, SA

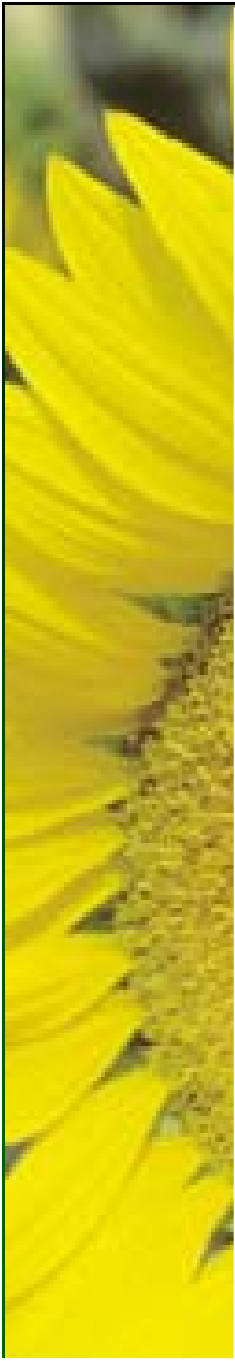
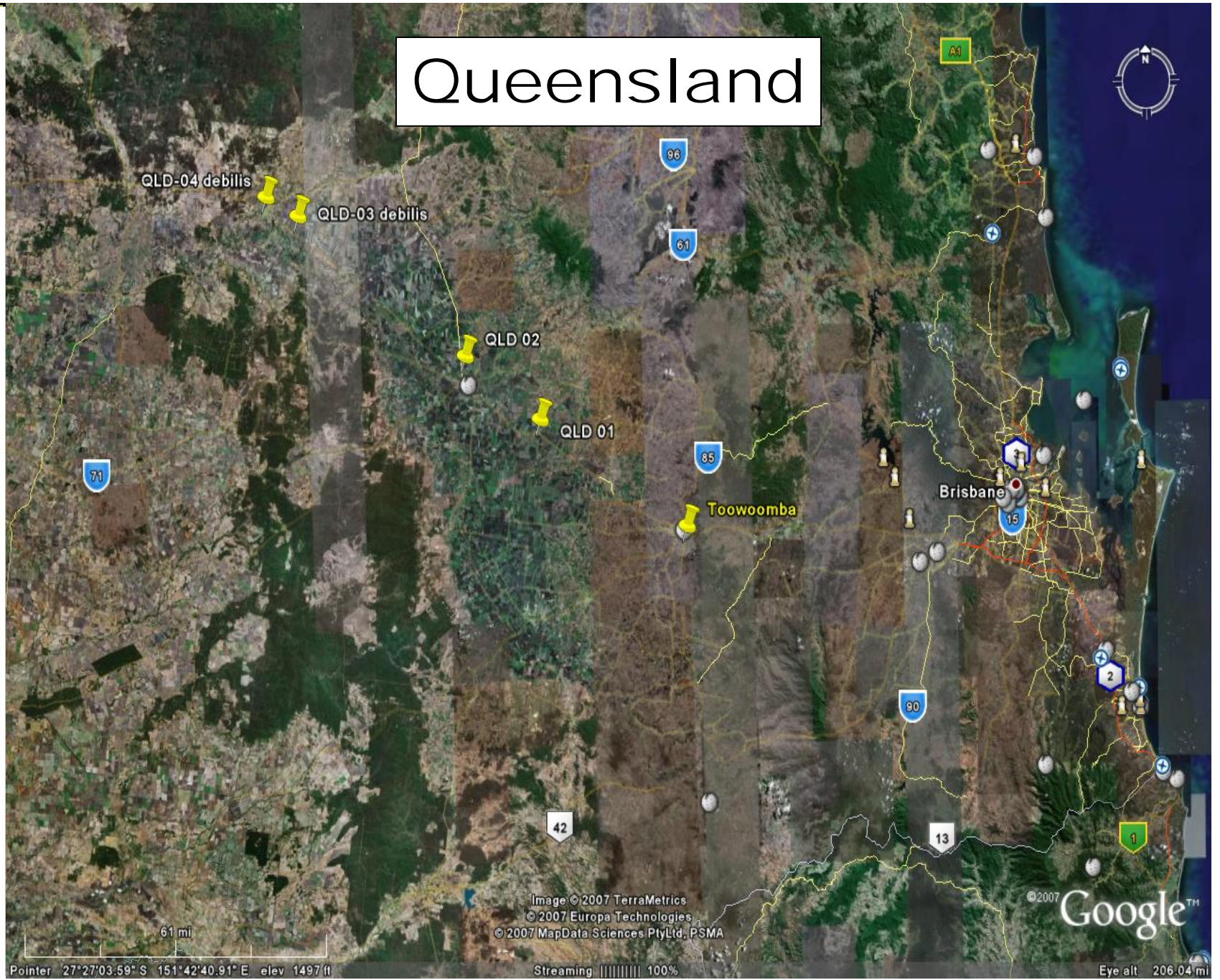


SAW - 4- Ceduna, SA



SAW-6 -Colwell, SA

Queensland





QLD-1- Bowenville, Qld



QLD-1- Bowenville, QLD



QLD-2- Dalby, QLD



QLD-2- Dalby, QLD



QLD-3 - *H. debilis* - Boonarga, QLD

The green plague

A cactus gone wild

Chinchilla was the heart of the prickly pear infestation; a plant introduced around 1850 for its flowers, fruit and appearance. It survived the dry, and flourished in good seasons, growing from broken pieces and seed. By the 1920s, 400,000ha of land was lost each year.

Still farmers came to the district, but many left defeated. Complete destruction was the only solution. But it continued to spread, creating impenetrable thickets 1.5 metre high. Land was made useless.



In attempts to destroy prickly pear, it was chopped and covered with sodas and gassed with chlorine and more toxic substances.

Supermoth - classic biological control

In 1924, Alan Dodd went to America to investigate biological control. He moved on to Uruguay and Argentina in hope of finding a bug to save rural Australia. From Buenos Aires, he sent eggs of the cactoblastis moth on a three month cruise, with prickly pear for their rations.

By 1925, moths from the 2750 surviving caterpillars produced 100,000 eggs. In 1926, there were two-and-a-half million. The first egg batches were released near Chinchilla... and the rest is history.

The prickly pear story remains the most successful example of biological control, ever.



The Bug Farm - Chinchilla with cactoblastis eggs being distributed throughout Queensland.

Life and death of prickly pear

- 1788 Prickly pear is brought to Sydney by Governor Phillip to establish a fabric dye industry for soldiers' red coats.
- 1839 The future pest species *Opuntia stricta* is recorded at Scone, NSW, and cuttings established on many pastoral properties.
- c1848 Matthew Goggs reportedly brings prickly pear to Chinchilla.
- 1870 The pear is becoming uncontrollable.

- 1883 Serious concerns exist for the spread of the plant in NSW.
- 1895 Queensland adds prickly pear to its list of noxious weeds.
- c1900 Four million hectares of land are infested.
- 1901 £5000 reward is offered for a solution to the prickly pear problem.
- 1907 Reward is doubled.

- c1912 Chlorine gas is used to control prickly pear.
- 1913 Selectors demand access to soda and arsenic at cost price to control the weed.
- 1920 Twenty-four million hectares of land is infested (more than the area of the United Kingdom).
- 1923 Queensland Royal Commission on Prickly Pear is established to investigate control or destruction.

- 1923 Alan Dodd establishes the experimental station, the 'Bug Farm', in Chinchilla.
- 1924 Prickly Pear Land Commission is formed.
- 1925 Three thousand eggs of the cactoblastis moth are imported from Argentina.
- 1931 Prickly pear is controlled. First development selections available in the Chinchilla region; 1318 applications.
- 1936 The Bug Farm is closed.

This project is supported by funding from the Australian Government's Regional Partnership Programme.

Photo: Marilyn Blundell collection





QLD-4 - *H. debilis* - Chinchilla, QLD

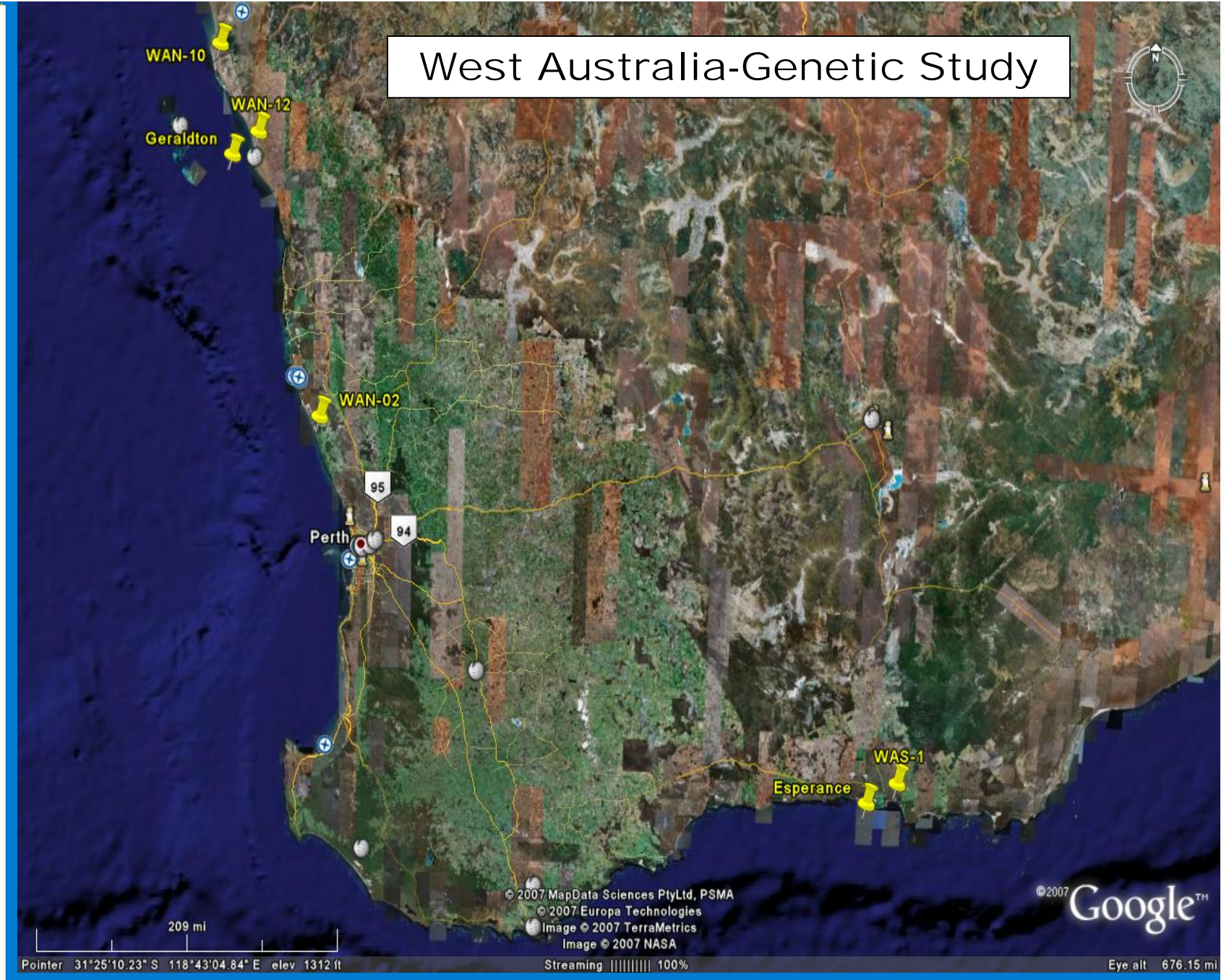
A retired Australian farmer proudly displaying a wild sunflower plant from a population that has been on his farm near Laura, South Australia for more than fifty years .



An avid gardener proudly displaying a population of wild sunflower that has been maintained for 78 years in her garden in South Australia.



West Australia-Genetic Study



Pointer 31°25'10.23" S 118°43'04.84" E elev 1312 ft

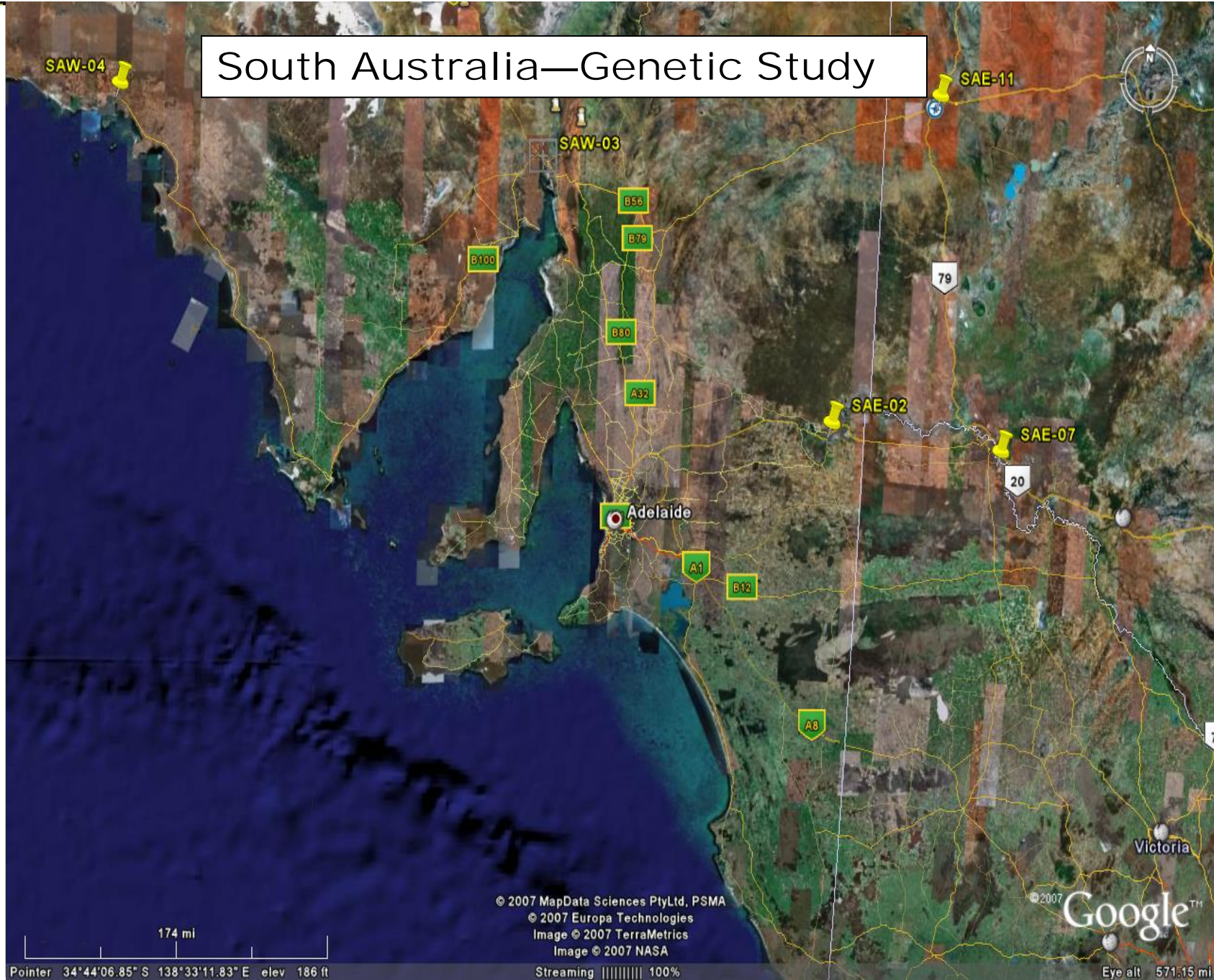
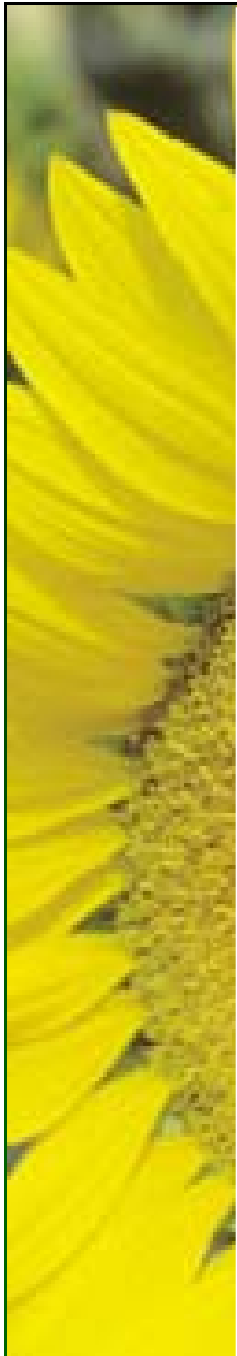
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Streaming ||| 100%

Eye alt 676.15 mi

South Australia—Genetic Study

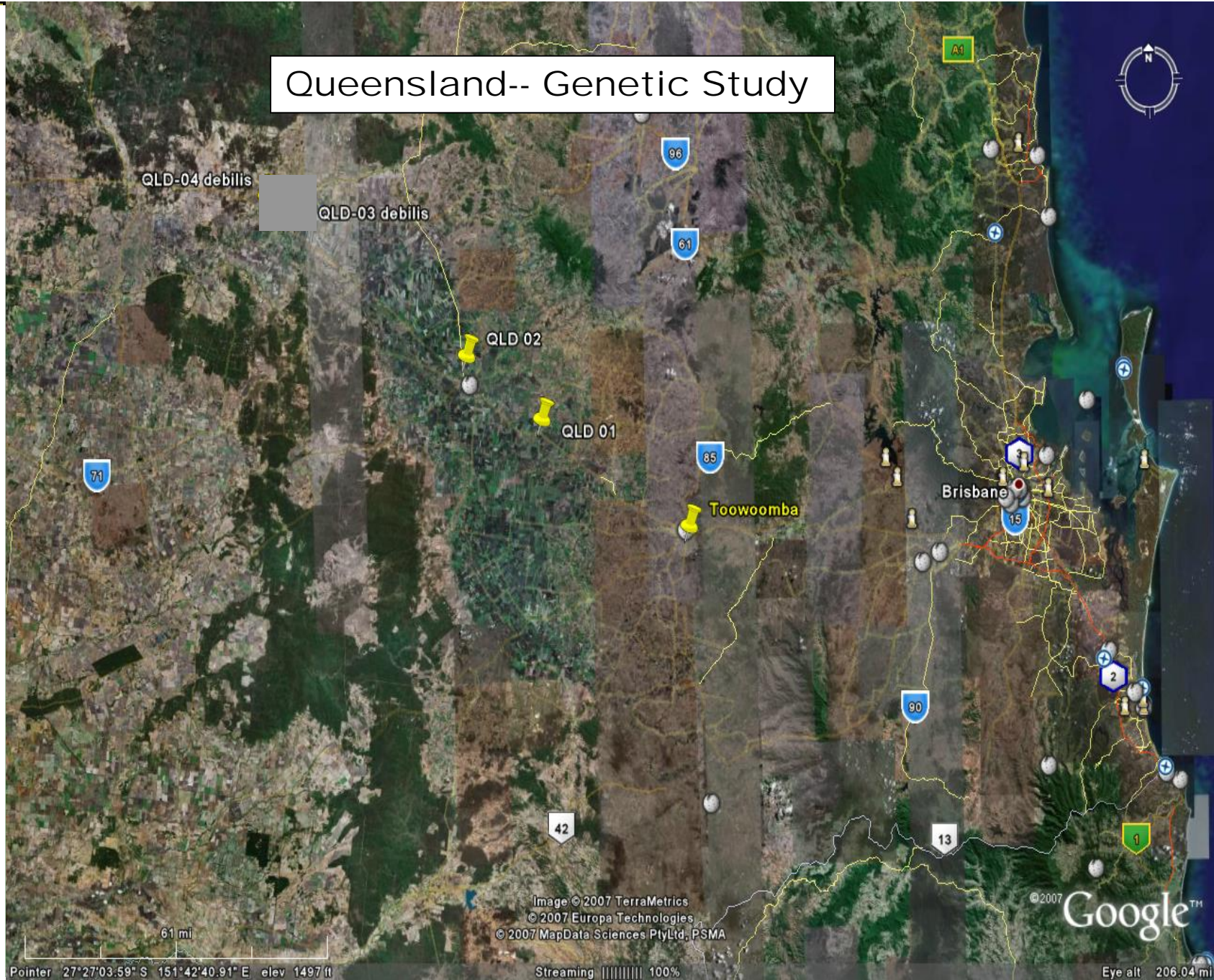
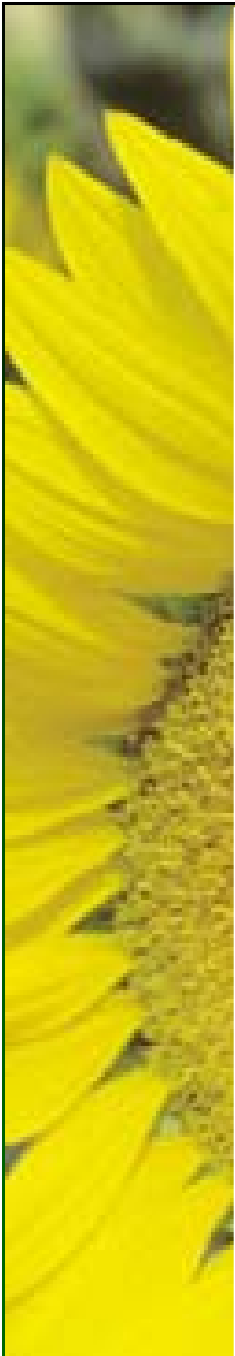


Pointer 34°44'06.85" S 138°33'11.83" E elev 186 ft

Streaming ||||| 100%

Eye alt 571.15 mi

Queensland-- Genetic Study



Pointer 27°27'03.59" S 151°42'40.91" E elev 1497 ft

Streaming 100%

Eye alt 206.04 mi









SAW - 4- Ceduna, SA



QLD--- Dalby Rubbish Tip

Summary

- Collected 37 *H. annuus* and 2 *H. debilis* populations from 4 states traveling over 10,000 km
- 11 populations of *H. annuus* collected for genetics study
- Populations small, scattered, rarely large, many surviving as ornamentals
- Distribution did not follow soil type as much as in US
- Evaluation for rust, downy mildew, oil content and composition



The Explorers---Perth, WA



QLD--- Dalby Rubbish Tip



Port Willunga, Adelaide, SA