RELEASING THE HOUNDS ON HUDSON PEAR

FINAL REPORT

Northern Slopes Landcare Association Inc.

2019 - 2020

NORTH WEST CACTI CONTROL COORDINATOR

NORTHERN SLOPES LANDCARE ASSOCIATION

35B Maitland Street, Bingara NSW 2404

The North West Cacti Control Coordinator program is funded through the North West Local Land Services.

NSW GOVERNMENT | Local Land Services

Contents

NSW DPI Reference	V18/5131 (CONT19/167)	Research Collaboration Sub-contract - Releasing the hounds on Hudson pear, A community driven integrated management program_April 2019
NW LLS Reference	NW00189	NW00189_LLS Contract for Services_Northern Slopes Landcare Association Inc_Releasing the Hounds_2019-20_April 2019

Executive Summary

"Releasing the Hounds on Hudson pear", A community driven integrated management program Community Management Program' is a Research Collaboration Project between NSW Department of primary Industries, North West Local Land Services and Northern Slopes Landcare Association Inc.

Funding was provided through the NSW Governments Office for Environment and Heritage and the Department of Regional NSW. The research arm of the program is supported by AgriFutures Australia (Rural Industries Research and Development Corporation), through funding from the Australian Government Department of Agriculture, as part of its Rural R&D for Profit program (PRJ-012378).

Through collaboration between Department of Primary Industries' Senior Research Scientist Andrew McConnachie, Castlereagh Macquarie County Council (CMCC) Weed Officers Mat Savage and Andrea Fletcher, North West Local Land Service (LLS) Regional Weed Officer Pete Dawson and Northern Slopes Landcare Association (NSLA) NW Cacti Control Coordinator Jo-Anna Skewes, a program was created to deliver an effective on-ground weed management approach. Another tool in the toolbox to help control the core infestations of Hudson pear.

The biocontrol agent for Hudson pear (*Cylindropuntia pallida*), a cochineal bug (*Dactylopius tomentosus* 'californica var. parkeri' lineage*)* is one of six lineages which are being used to manage the eight invasive *Cylindropuntia* spp. in Australia.

Resources have been developed to help guide the community to correctly identify the invasive Hudson pear, create awareness around how to travel through the area without spreading it, and how to integrate the various control tools (chemical, biocontrol and manual removal) on their mining claim or property. The resources where developed keeping in mind the accessibility to resources in the area. These can be found on the Northern Slopes Landcare website to view and download while their hard copies widely available in the region.

Throughout the program workshops were held which included updates on the progress of the biocontrol agent, mapping and GPS training. AQF3 training was provided to enable the community to upskill in units that included use of chemicals to control pests, weeds and diseases and transport and store chemicals. These were very well attended, all of the training offered was at full capacity, with 85 community members from Lightning Ridge, Grawin, Cumborah, Lightning Ridge Mining Association, Grawin Glengarry and Sheepyards Mining Association and National Parks and Wildlife Services attending.

The Lightning Ridge and surrounding area had its challenges by learning who the champions are in the area and how they received their information at it can be quite varied. To combat these issues resources were developed in different forms including web versions and print versions. This has made the resources accessible to the community whether they have the internet or not. The web versions were and posted on all social media platforms that were known and hardcopies handed out and left in high traffic areas.

Another identified barrier was that community members did not know who their weed officer was or historically had had a bad experience with a weed officer. By working with the CMCC weed officers and working with the weed officers to not only participate in the workshops and training sessions but they encouraged all landholders and miners to have a follow up session with the them to discuss how they can create a healthier landscape with integrated control options. This showed

the community that CMCC are here to help and guide them on to how to best manage Hudson pear on their property or mining claim.

This program has the potential to be a blueprint for not only other biological programs that require mass-rearing and community involvement but community programs that require community-based weed control program. Starting with the community to find out what their barriers are, what the benefits consist of and the impacts these behaviours have, to then create a program that will work for the community and associated organisations.

Overall, the program has helped develop a greater understanding of integrated control methods including the introduction of the new biological control agent for Hudson pear. With the help of resources and expert knowledge the program has helped bridge the communication gap between government organisations and the all-encompassing all-inclusive community – creating a community biological control program.

Key recommendations:

- Written - Quarterly or milestone media releases giving an update on project
- Visual - Quarterly and/or milestone video interviews with project team
- Identify and produce resources early in the project to assist with field days, workshops and training
- Create awareness tools for the tourism industry in the area (tourism information centres, tourism hotspots and high traffic areas)
- Find out where the community gather and go to them rather than asking them to come to you

Image (left to right): Jo Skewes (NW Cacti Control Coordinator, NSLA), Mat Savage (Weeds Officer, CMCC), Peter Dawson (Regional Weeds Coordinator, NW LLS), Andrea Fletcher (Senior Weeds Officer, CMCC) and Andrew McConnachie (Senior Research Scientist, NSW DPI).

Milestone 1. Engagement of North West Cacti Control Coordinator.

Engagement of the North West Cacti Control Coordinator through Northern Slopes Landcare Association Inc. This was achieved to roll out the program and associated Biocontrol Release Strategy.

Milestone 2. Develop awareness and knowledge products.

Purpose: To produce resources that are informative, on topic, easy to read and understand and easy to access.

Aim: For the community to be able to have "on-hand" or in your "glove-box" resources to correctly identify priority cacti, prevent cacti from spreading and how to best control, dispose and avoid cacti by using integrated control options best suited for individual situations.

Result: Wild Matters was engaged to develop the Field ID Guide and poster based on the *Opuntioid cacti field identification guide.* This guide has been noted as popular and a handy 'glove box' tool throughout the cacti field. The final product was completed in hard copy and a web version. These can be found on the Northern Slopes Landcare Association and North West Local Land Services website. Hard copies have been and continue to be distributed throughout the region.

Reasydesigns was engaged to design and compile the factsheets and DL brochure. The information was compiled using WeedWise to best create a broad scope of awareness and to make sure information is consistent across organisation, industries and Government departments. All resources have been distributed and well received.

Contract extension

Due to the COVI19 pandemic impacting on the delivery of some milestones an extension of time was requested from and granted by NSW DPI in June 2020.

Field ID Guide - Invasive Cacti Field Guide – Identification and control of invasive cacti, North West NSW.
https://www.northernslopeslandcare.com.au/images/Cacti/5537_Cacti_Booklet_Ver yFINAL_WEB.pdf

NW Priority Cacti Poster - Invasive cacti in North West NSW – Identification and biological control options.
https://www.northernslopeslandcare.com.au/images/pdf/cacti/5533_WONS_Poster_1810_Web.pdf

Biocontrol Factsheet - Biocontrol of Hudson pear *Cylindropuntia pallida* using the cochineal *Dactylopius tomentosus* ('*californica* var. *parkeri*' lineage)
https://www.northernslopeslandcare.com.au/images/Cacti/CochinealBiocontrol_H udsonpear_HIGHRes.pdf

Hudson Pear Factsheet - Seen This Plant? Hudson pear *Cylindropuntia pallida*
https://www.northernslopeslandcare.com.au/images/Cacti/SeenThis_HudsonPear_HI GHRes.pdf

DL – Brochure - Come clean go clean – Help stop the spread of invasive cacti
https://www.northernslopeslandcare.com.au/images/Cacti/TourismCacti_DLfold ed_H IGHRes.pdf

Learnings:

- Finding out what the community want and need before the start of a project, creates a useful and well sort after product.
- Understanding knowledge gaps and implementing them into resources improve the resource.
- Communication has many barriers particularly over time when messaging of the product scope can get lost. Meeting face to face offers many opportunities to visually correct thoughts, ideas and massages.
- The contractual quote for the publication only allowed for two revised edits which was not enough. The process required more revised edit and reviewing of the document. Due to the lack of revised edits of the publication there were edits that were asked for and were not complete before the booklet went to print.
- Identify early a review panel of experts. Possibly, utilising the NW Cacti Control Coordinator steering committee or another person to review documents and or publications to help eliminate errors. Allowing for at least three revised edits on new publications and allow in budget and identify on quote what the cost would be for extra edits to be made.

Milestone 3. Implement Communication and Engagement Strategy

Purpose: To produce an online resource that is informative, on topic, easy to access and understand.

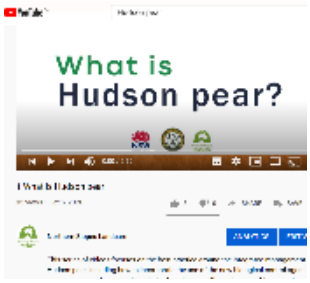
Aim: To create another resource on a different media that correctly identifies Hudson pear, *C. pallida* as a priority cacti, prevent the cactus from spreading and how to best control, dispose and avoid cactus by using integrated control options best suited for individual situations.

These videos include how, what, where, when and why or why not of biocontrol and chemical control. The videos were designed around questions the community have asked at workshops, meetings, gatherings, and functions about the control of cacti.

Result: Unfortunately, the filming took place twice due to unknown reason of the videographer. A second videographer Jason Archer was contracted and produced 10 videos that were able to be upload to YouTube. This will be used at workshops, websites, social media outlets, presentations, and other training opportunities as educational tools. They are accessible to the wider community via the Northern Slopes YouTube channel as of October 5, 2020.

YouTube Videos
https://www.youtube.com/playlist?list=PLmSrgp-AUIktRkaObd2twzqzkuYlRtu4W



Learnings:

- Contractual default by original videographer was unavoidable creating a delay.
- YouTube audience watch for an approx. 2 mins.

Statistics:

Northern Slopes Landcare YouTube channel as of December 2020.

1.	What is Hudson pear?	114 views
2.	What is cochineal and how does it work?	39 views
3.	Don Mackenzie Weed Biocontrol Facility	3 views (released 24 Nov)
4.	Collecting cladodes	26 views
5.	Storing and transporting cladodes	21 views
6.	Releasing infected cladodes Hurry up and wait!	28 views
7.	GPS and mapping	24 views
8.	Control methods	21 views
9.	Stop the spread of hygiene	22 views
10.	Program and conclusion	32 views

Milestone 4. Education, skills and training delivered

Purpose: To fill an identified knowledge gap within the community.

Aim: To provide information, skills and training to the community as identified be the community. They saw the need to be informed on the biological control for Hudson pear and to be skilled and certified to transport, handle, use and read affiliated material correctly when using chemical.

Results: These trainings content was specifically simplified and reduced to be effectively communicated to the community. The instructor was brief on the community and the reasons as to why the community was there and communicated effectively with each group. The groups were very pleased with the day and how much they learnt.

AQF3 accreditation training workshops



AQF3 accreditation - 02 August 2019, Lightning Ridge.


AQF3 accreditation - 28 August 2020, Grawin.


AQF3 accreditation - 29 August 2020, Lightning Ridge.

Biological release workshops



Biological release workshop – 04 February, Lightning Ridge.

Biological release workshop – 07 February, Cumborah.

Biological release workshop – 08 February, Grawin.

Learnings:

- Expression of interest created a database of people wanting to be upskilled or just wanting to have a chat about Hudson pear in general. This then created awareness around the program and what was being achieved on ground in the community and what was still needing to be achieved.
- The best time to engage with the Grawin community is on a Friday.
- The best time to engage with the Cumborah community is on a Saturday and advertised through the pubs and local champion – Identifying the local champion/s of the area/s was a challenge.
- Lightning Ridge either late in the week or a Saturday to catch the people who work.
- Run training and workshops in August as attendance was higher.

Statistics:

AQF3 training

- 02 August 2019 Lightning Ridge 22 participants
- 07 August 2020 Grawin 16 participants (Covid-19 restrictions)
- 08 August 2020 Lightning Ridge 14 participants (Covid-19 restrictions)

Biological release training workshops

- 03 February 2020 Lightning Ridge 18 participants
- 07 February 2020 Cumborah 10 participants
- 08 February 2020 Grawin 05 participants

Milestone 5. MERI.

Purpose: Baseline maps will be use as a community awareness and education tool. Please see below Walgett Shire Biocontrol Release Sites.

Aim: Create awareness where the biocontrol has been released, where the release gaps are and where releases still need to be made in the community. The maps will also further feed ongoing planning for NW LLS, NSLA, CMCC and DPI

Results: These maps are on-going and have been plotted on maps to help identify where the releases have been made. As this has been a final stage in the program the maps have not been released to the public to-date. Feedback was gained from the Hudson Pear Taskforce in November 2020.

Learnings:

- Quarterly financial updates to reduce scope creep and budget creep.
- Skillset requirements of staff to carry out this project requires an increase in the available budget for similar projects in the future in order to ensure successful outcomes continue.

Table 1: Budget overview.

Milestone	Budget	Spent	Remaining balance (+/-)	Explanation (+/-)
1: Engagement of NW CCC (on-ground cost)	$43,750.00	$46,936.75	-$3,186.75	Under-estimated the costs including travel costs.
2: Awareness and knowledge	$30,000.00	$29,804.57	$195.00	
3: Communication and Engagement	$7,500.00	$6,759.02	$740.98	Under-estimated the time allowed for filming.
4: Education, Skills and Training	$16,500.00	$16,672.00	-$172.14	Due to covid-19 extra expenses with catering.
5: MERI (mapping and reporting)	$2,250.00	$2,385.00	-$135.00	The purchase of 15 GPS' were $159.00 an increase of $9.00 since project was written.
Total	$100,000.00	$100,172.48	-$2,557.48	

Statistics

Social Media

Table 2: Website statistics for NSLA as of October 2020, www.northernslopeslandcare.com.au

Dated posted	Project advertised	Hits
5 December 2019	Workshops – Save the date	124
5 December 2019	Workshops – Lightning Ridge	538
5 December 2019	Workshops – Cumborah	244
5 December 2019	Workshops – Grawin	206
11 November 2019	Invasive Cacti in the NW (poster)	405
11 November 2019	Invasive cacti Field Guide	519
13 December 2019	Cactus Quarterly – Summer	305
6 March 2020	AQF3 Training	88
19 March 2020	Cactus Quarterly – Autumn	253
16 April 2020	AQF3 Postponed	209
22 April 2020	Come Clean Go Clean survey	1068
12 May 2020	Biocontrol – Expression of Interest	804
25 May 2020	Biocontrol – Expression of Interest online form	238
26 May 2020	Cochineal released to destroy rampant Hudson pear cactus near Lightning Ridge	101
03 June 2020	Mass-rearing facility OPEN – come get your cochineal	403
07 July 2020	Hudson pear biocontrol factsheet	135
07 July 2020	Seen This Plant? Hudson pear	126
09 July 2020	Come clean, go clean	162
27 July 2020	Cochineal continue to have a significant impact despite good rain	131
June 2020	AQF3 Training – Grawin	208
June 2020	AQF3 Training – Lightning Ridge	172
12 August 2020	CQ – Winter	126

Table 3: Facebook statistics for NSLA as of October 2020, https://www.facebook.com/NorthernSlopesLandcareAssociation/

Dated posted	Project advertised	Reached	NW LLS
11 November 2019	Invasive cacti Field Guide	171	579
5 December 2019	Biocontrol Workshops – Save the date	93	876
13 December 2019	Cactus Quarterly – Summer	96	
20 January 2020	Biocontrol Workshops	98	
29 January 2020	Biocontrol Workshops	70	1675
4 February 2020	Biocontrol Workshops – Lightning Ridge	195	
7 February 2020	Biocontrol Workshops - Cumborah	112	
6 March 2020	AQF3 Training	88	
19 March 2020	Cactus Quarterly – Autumn	50	
16 April 2020	AQF3 Postponed	69	
22 April 2020	Come Clean Go Clean survey	1586	1499
13 May 2020	Biocontrol – Expression of Interest online form	70	615
03 May 2020	Mass-rearing facility OPEN!	98	
23 June 2020	AQF3 Training	83	
16 July 2020	Come clean go clean	94	
16 July 2020	Hudson is cactus – article	220	
17 July 2020	Seen This Plant? Hudson pear	49	

Table 4: Facebook Groups and community members joined, Workshops, EOI and Survey

Facebook Group	Members
Walgett Collarenebri Lightning Ridge Buy Swap Sell	2062
Walgett Area Notice Board	7094
Mungindi Notice Board	87
~Hebal, Lightning Ridge and Surrounding Areas Buy Swap Sell~	1052

Table 5: Facebook Groups / Liked contacted to post, Come Clean Go Clean survey

Facebook Group	Members
iMotorhome and Caravan – posted 13 May 2020	30,024
Jayco Caravanland	
Jayco Australia	
Caravanning Australia	
Australia's North West	
RV Daily	
Campervan and Motorhome Club of Australia	
Camps Australia Wide	
Free Camping Australia	
Wiki Camps	
Camp Around Australia	
Lets Go Caravan and Camping	
Everything Caravan and Camping	

Appendix

1. **Invasive Cacti Field Guide** – Identification and Control of invasive cacti, North West NSW
2. **NW Priority Cacti Poster** - Invasive cacti in North West NSW – Identification and biological control options.
3. **Biocontrol Factsheet** - Biocontrol of Hudson pear *Cylindropuntia pallida* using the cochineal *Dactylopius tomentosus ('californica* var. *parkeri*' lineage)
4. **Hudson Pear Factsheet - Seen This Plant?** Hudson pear *Cylindropuntia pallida*
5. **Come clean go clean** – Help stop the spread of invasive cacti
6. **AQF3 Training** – 04 August 2020
7. **AQF3 Training** – 28 & 28 August 2020
8. **Hudson pear Biocontrol Release Workshops** – 4,7 & 8 February 2020
9. **Hudson pear biocontrol release maps**
    - Cumborah, *C. pallida*
    - Grawin, *C. tunicata*
    - Grawin, *C. pallida*
    - Lightning Ridge, *C. prolifera*
    - Lightning Ridge, *C. tunicata*
    - Lightning Ridge, *C. pallida*
    - Walgett Shire biocontrol release and containment areas
10. **Mass-rearing facility open**
11. **Mass-rearing facility media release**
12. **Budget**

Invasive Cacti Field Guide

Identification and control of invasive cacti, North West NSW

Invasive cacti
in North West NSW

Identification and biological control options

Austrocylindropuntia cylindrica
Cane cactus

Erect, branching shrub 0.3-1.5 m tall. Often forms patches several metres wide. Deciduous leaves to 1 cm long.

Dark bluish-green, shiny. Cylindrical, 15-50 cm long, 3-4 cm diameter.

2-6 spines per areole, approx 1 cm long. (Lacks papery sheath)

Pink-red, cup-shaped, 2.5 cm diameter.

Egg to urn shaped, to 4.5 cm long. Deep green to green-yellow. (Can produce chains)

See p. 37 of the *Invasive Cacti Field Guide* for more information

Cylindropuntia fulgida var. *mamillata*
Coral cactus, boxing glove cactus

Erect shrub 0.4-1 m tall. Deciduous leaves. Rarely flowers/fruits.

Green to grey-green. Often distorted, with a corrugated (tuberculate) surface, 10-22 cm long, 2-4.5 cm diameter. Often numerous, easily detached small segments.

4-15 spines per areole, 0.7-2 cm long (often shorter). Cream to brown (colour variable). (White to tan sheath)

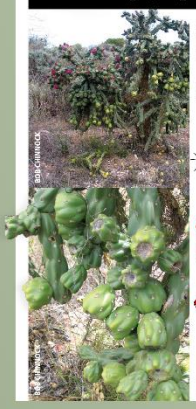
Deep red. Rarely flowers.

Inverse cone or egg-shaped. Green to grey-green. Forms long chains. Usually sterile.

Biocontrol
Dactylopius tomentosus ('cholla' lineage)

See p. 39 of the *Invasive Cacti Field Guide* for more information

Cylindropuntia imbricata
Devil's rope, rope pear



Branched shrub or small tree 1-3 m tall. Often with short trunks. Deciduous leaves.

Dull grey-green. 15-40 cm long, 3.5-5 cm diameter. Large, widely spaced tubercles give a woven, rope like appearance.

2-12 spines per areole, 0.8-3 cm long. Trunks often covered in spines. Off white-cream. (Off white-cream sheath attached)

Dark pink, magenta.

Fleshy, egg shaped, to 4 cm long. Greenish-yellow when ripe. (Can form chains)

Biocontrol
Dactylopius tomentosus ('Cylindropuntia' lineage)

See p. 41 of the *Invasive Cacti Field Guide* for more information

*Cylindropuntia pallida**
Hudson pear (White-spined)

Low, spreading shrub, 0.5-2 m tall. Up to 3 m wide. Old plants can develop trunks, but not commonly seen. Deciduous leaves.

Grey-pale green. 4.5-26 cm long, 1.5-3.5 cm diameter. Easily detached. Prominent tubercles.

7-14 spines per areole, 1-4 cm long. White to light brown. (White sheath loosely attached)

Pink to purple.

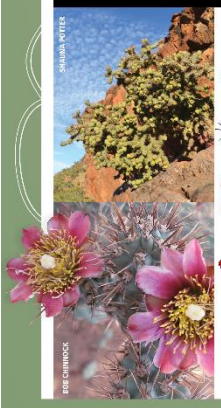
Oblong to egg shaped, to 3 cm long. Green to yellow-green. Sterile hybrid.

Biocontrol
Dactylopius tomentosus ('californica var. parkeri' lineage)

* Formerly known in Australia as *C. rosea*

See p. 43 of the Invasive Cacti Field Guide for more information

Cylindropuntia prolifera
Jumping cholla



Low shrub 0.4-1 m tall. Deciduous leaves.

Greenish grey. 4-15 cm long, 4-5cm diameter. Easily detached. Prominent tubercles.

7-11 spines per areole, 1-2 cm long. Light to dark brown, interlacing. (White to tan sheath firmly attached)

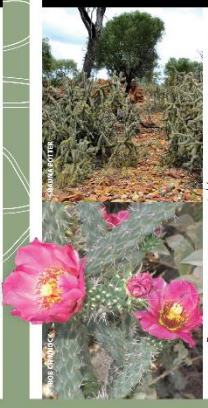
Rose to magenta.

Top shaped, 2-5 cm long. Green. Can form chains. Usually sterile.

Biocontrol
Dactylopius tomentosus ('californica var. parkeri' lineage)

See p. 45 of the *Invasive Cacti Field Guide* for more information

Cylindropuntia spinosior
Snake cactus



Erect shrub 1-3 m tall. Often forming patches several metres wide. Similar to *C. prolifera*, but different spine and fruit colour. Deciduous leaves. May develop a trunk.

Mid grey-green. 10-24 cm long, 1.5-3 cm diameter. Firmly attached. Prominent tubercles.

6-24 spines per areole, 0.8-1.5 cm long, interlacing. White to grey. (White sheath firmly attached)

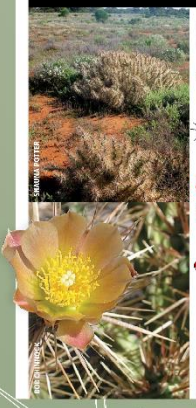
Rose-purple. 3-7.5 cm diameter.

Fleshy, cylindrical to egg-shaped, 4 cm long. Yellow, sometimes green.

Biocontrol
Dactylopius tomentosus ('bigelovii' lineage)

See p. 47 of the *Invasive Cacti Field Guide* for more information

Cylindropuntia tunicata
Hudson pear (Brown-spined)



Low, densely branched shrub 0.3-0.6 m tall. Deciduous leaves.

Pale grey-green. 10-20 cm long, 1.5-3 cm diameter. Easily detached. Prominent tubercles.

4-7 spines per areole, 3-7 cm long. Red-brown to pale brown. (Brownish sheath loosely attached)

Yellowish-brown.

Club to top shaped. Greenish-yellowish to red. Spineless. Usually sterile.

Biocontrol
Dactylopius tomentosus ('acanthocarpa × echinocarpa' lineage)

See p. 49 of the *Invasive Cacti Field Guide* for more information

Opuntia aurantiaca
Tiger pear

Low spreading shrub to 0.5 m tall. Branches prostrate to somewhat erect.

Dark green to dark purple. Cylindrical to flattened. Up to 20 cm long. Easily detached. No tubercles.

Usually 2-3 spines per areole, 1-3 cm long. Brown-yellowish.

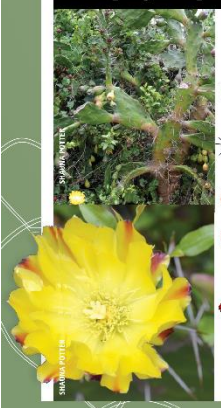
Yellow to orange-yellow.

Fleshy, globular shaped, to 3 cm long. Red-purple. Sterile.

Biocontrol
Dactylopius austrinus and *Cactoblastis cactorum*

See p. 51 of the *Invasive Cacti Field Guide* for more information

Opuntia monacantha
Drooping tree pear



Erect shrub to 2 m tall, sometimes with a short trunk. Plant has an obvious drooping appearance.

Glossy green. Linear to elliptic, tapering towards base, thin profile. 20-50 cm long, 12-18 cm wide.

1-2 spines per areole (but increasing to 4-5 in older parts of the plant), 2-4 cm long. Brown to off-white.

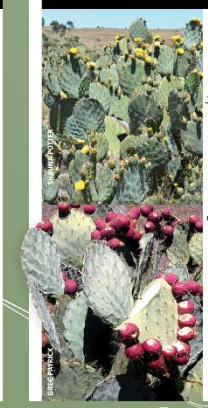
Yellow, outermost tepals red. 5.5-7 cm diameter.

Pear-shaped tapering to a stalk-like base, 5-7 cm long. Green to reddish, spineless, often forming chains of fruit.

Biocontrol
Dactylopius ceylonicus

See p. 53 of the *Invasive Cacti Field Guide* for more information

Opuntia robusta
Wheel cactus



Shrub with multiple stems up to 4 m tall (commonly 1-2 m).

Blue-green. Flattened, circular, up to 40 cm wide.

2-12 spines per areole, up to 5 cm long. White to pale brown or yellow.

Yellow, 5-8 cm diameter.

Fleshy, globular shaped, to 8 cm long. Deep red. Numerous fertile seeds.

Biocontrol
Dactylopius opuntiae

See p. 55 of the *Invasive Cacti Field Guide* for more information

Opuntia stricta
Common prickly pear

Sprawling/erect shrub, up to 2 m tall. Forms thickets.

Green to grey green. Eliptic to obovate, 10-25 cm long.

In *O. stricta* var. *stricta*, spines are absent or the occasional one may be present on a pad. In *O. stricta* var. *dillenii*, there are up to 11 spines per areole, 1.5-4 cm long.

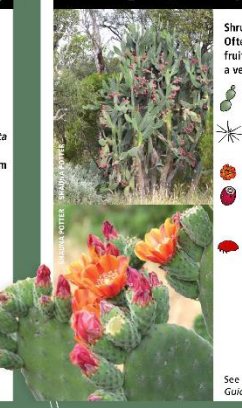
Yellow, 6 cm diameter.

Fleshy, globular to pear-shaped, to 6 cm long. Purplish red. Numerous fertile seeds.

Biocontrol
Dactylopius opuntiae and *Cactoblastis cactorum*

See p. 57 of the *Invasive Cacti Field Guide* for more information

Opuntia tomentosa
Velvet pear, Velvety tree pear



Shrubby to treelike, up to 5 m tall. Often with a trunk. Cladodes and fruits covered in fine hairs, giving a velvety appearance.

Grey-green. Flattened, elliptic to obovate, 15-30 cm long.

Often spineless, but can have 0-4 spines, 0.5-1.5 cm long. Whitish-yellow.

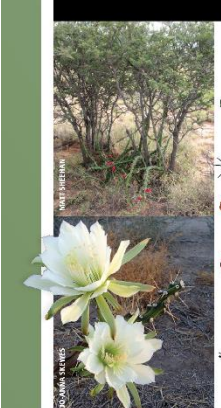
Orange, 4-5 cm diameter.

Globular to egg-shaped, with flattened top, up to 5cm long. Red.

Biocontrol
Dactylopius opuntiae

See p. 59 of the *Invasive Cacti Field Guide* for more information

Harrisia martinii



Perennial herb, forming large tangled mats, 30-60 cm high. Can climb up existing shrubs and trees.

Bright green fleshy, multi-branched, succulent stems 2-5 cm thick with 5-6 ribs running lengthways, each bearing spines in areoles.

1-3 central spines per areole, 1-3.5 cm long and 5-7 radial spines 1-6 mm long.

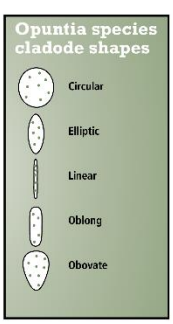
White, large, funnel-shaped, 15-20 cm long, opening at night and withering in early morning.

Red, almost spherical, spiny 3.5-5 cm diameter. Fruit splits down side when ripe, exposing 400-1000 black seeds embedded in white pulp.

Biocontrol
Hypogeococcus feserianus (Mealybug)

See p. 61 of the *Invasive Cacti Field Guide* for more information

Opuntia species cladode shapes



Key to symbols

Cladodes (Stem segments)

Flowers

Fruits

Spines

Biocontrol

Cochineal

Mealybug

Cactoblastis

Glossary

Areole – small circular or elongated woolly cushion area on the surface of segments.

Cladode (Stem segment) – a modified, swollen, water storing stem segment, often refered to as pads in *Opuntia* species.

Glochids – small, detachable barbed bristles.

Sheath – papery outer covering of the spine. Only present in *Cylindropuntia* species.

Tepal – the term given to the outer part of flowers when it cannot be easily divided into sepals and petals.

Tubercle/tuberculate – a small raised area or nodule on a plant surface/having tubercles.

Biological Control (biocontrol) is one of many ways to reduce the impact of invasive cacti. Biocontrol is best used on large areas of weeds, where there are lots of plants growing closely together. It can also be combined with other control methods such as chemical control or physical removal.

Refer to the *Invasive Cacti Field Guide, North West NSW* for more information on controlling cacti for your situation.

www.northernslopeslandcare.com.au
www.northwest.lls.nsw.gov.au

WEED OF NATIONAL SIGNIFICANCE

NSW GOVERNMENT

Northern Slopes Landcare Association Inc.

NORTH WEST

No Space for Weeds

Biocontrol of Hudson pear *Cylindropuntia pallida* using the Cochineal *Dactylopius tomentosus (californica var. parkeri)*

What are cochineal?

Cochineal are soft-bodied scale insects that feed solely on plants in the cactus family, especially species in the genera *Opuntia* and *Cylindropuntia*.

Four cochineal species have been released and established as biocontrol agents in Australia, some of which have different lineages that specifically target different *Opuntia* and *Cylindropuntia* species.

The various lineages differ significantly in their impact so it is important to match the correct lineage to each target species.

What do cochineal look like?

Cochineal are easily identifiable on cacti when females have attached themselves to the plant, and have covered themselves with a white, wax-like covering.

Adult females are:

- soft-bodied
- oval shaped
- deep red-coloured
- wingless
- 2 - 2.7 mm long
- sessile (i.e. once they start feeding, they do not move).

Adult males are:

- winged and able to disperse
- difficult to see
- 1.55 mm long.

Eggs are:

- red in colour
- oval shaped
- 0.3 mm wide and 0.5 mm long
- able to hatch in approximately 17 days.

Nymphs are:

- a deep red-colour
- 1 mm long
- wind dispersed
- male nymphs are able to spin a white, silky cocoon.

NORTH WEST

No Space for Weeds

Seen this plant?

Hudson pear

Cylindropuntia pallida

Hudson pear is an invasive cactus species of Mexican origin that has naturalised in a variety of habitats in north-western NSW. It has pink to purple coloured flowers, large spines and grows up to 1.5 m high and 3 m wide.

It spreads easily and rapidly and is hard to manage, seriously degrading invaded land and ecosystems.

How does this weed affect us?

Hudson pear has serious consequences and the potential to:

- injure people, stock and pets
- reduce land value
- displace native flora
- kill native fauna including koalas
- make mustering difficult
- penetrate skin, shoes and tyres with its vicious spines.

The spines have a sheath which can stay in a wound after the spine is taken out. This can cause more pain and inflammation.

Seen it? Call us:

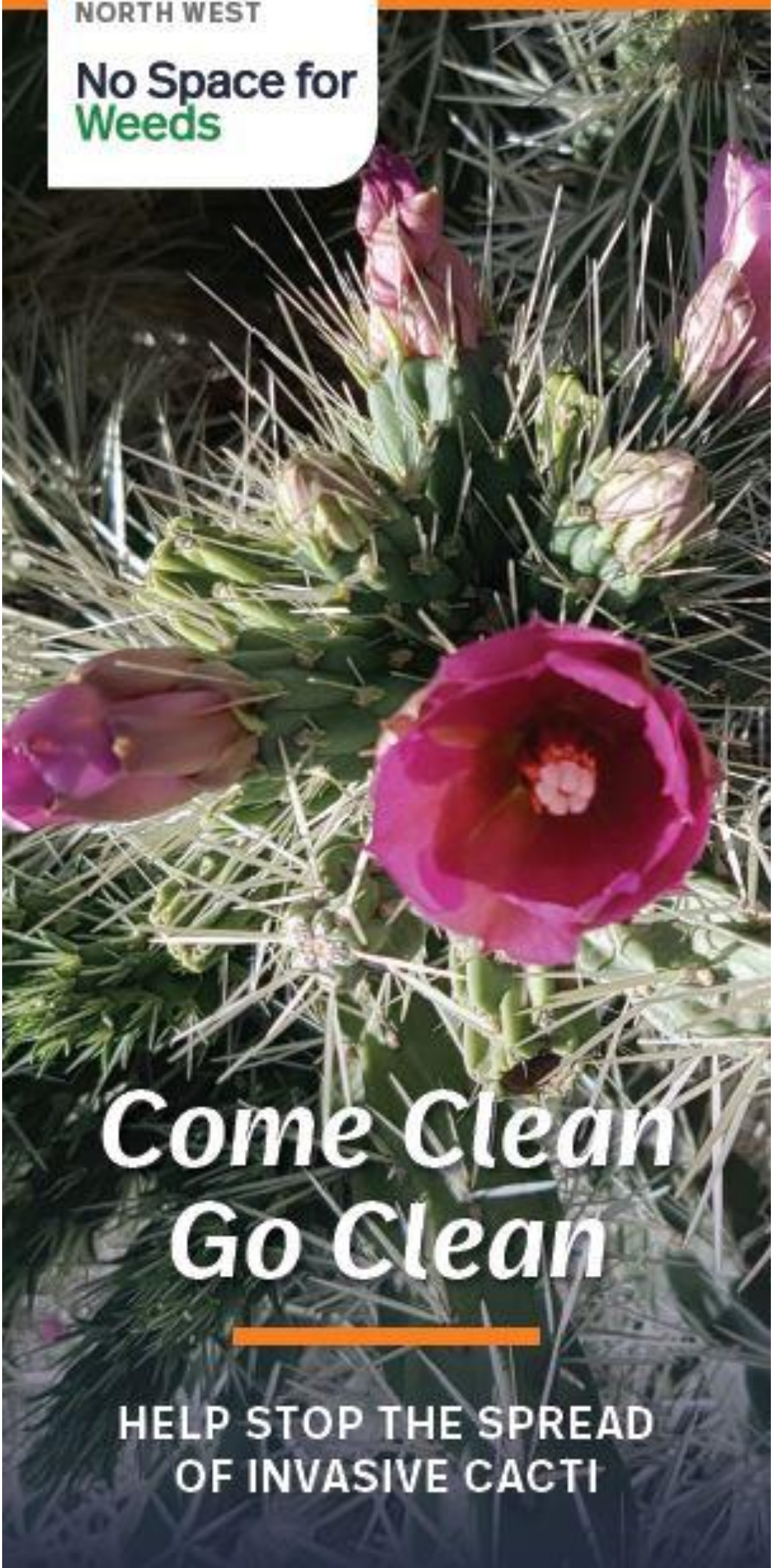
Help protect our land, plants and wildlife. If you spot any infestations of Hudson pear, please contact:

BIOSECURITY WEEDS OFFICER
WALGETT SHIRE COUNCIL
0428 462 060
0497 013 086

NSW BIOSECURITY HELPLINE
1800 680 244

NORTH WEST

No Space for Weeds



Come Clean Go Clean

HELP STOP THE SPREAD OF INVASIVE CACTI

NORTHERN SLOPES LANDCARE

AQF3 CHEMICAL ACCREDITATION

The course is being delivered by Chemqual (RTO70207)

FREE COURSE

Morning Tea and Lunch will all be provided

FRIDAY 2 AUGUST

LIGHTNING RIDGE BOWLING CLUB

8.30AM - 4.00PM

Places are limited
Must book to reserve your place!

Bookings at

STICKY TICKETS - https://www.stickytickets.com.au/89509

For more information
Jo Skewes on 0402 014 769 or nwcactus@gwydir.nsw.gov.au

Funded through the Release the Hounds project and supported by:

NSW GOVERNMENT Local Land Services

Northern Slopes Landcare Association Inc.

CASTLEREAGH MACQUARIE COUNTY COUNCIL WEED CONTROL

AQF3 CHEMICAL ACCREDITATION

The course is being delivered by ChemCert(RTO90855)

LAST FREE COURSES
TO BE RUN UNDER THIS PROGRAM

You will also get an update on what is happening out in the field with **Hudson pear** and learn how to use a **GPS** and record information.

Units gained:
AHCCHM304 Transport & Store Chemicals
AHCCHM307 Prepare & Apply Chemicals to Control Pest, Weeds and Diseases

FRIDAY 28 AUGUST
THE CLUB IN THE SCRUB, GRAWIN
8.30AM - 5.00PM

SATURDAY 29 AUGUST
LIGHTNING RIDGE BOWLS CLUB
8.30AM - 5.00PM

Morning Tea and Lunch will all be provided

Places are limited to 15 people per course due to Covid-19 restrictions.
Register As Soon As Possible to secure your place.

RSVP before 24 August 2020

To book contact

NW Cacti Control Coordinator - Jo Skewes

0402 014 769 or **nwcactus@nsla.net.au**

"Releasing the Hounds on Hudson pear" – a Community biological control management program. A collaboration between NSW Department of Primary Industries, North West Local Land Services, Northern Slopes Landcare Association and Castlereagh Macquarie Weeds County Council and funded through the NSW Governments Office for Environment and Heritage.

NSW GOVERNMENT

Northern Slopes Landcare Association Inc.

CASTLEREAGH MACQUARIE COUNTY COUNCIL WEED CONTROL

HUDSON PEAR BIOCONTROL RELEASE WORKSHOP

Find out more about
the biocontrol of Hudson pear, including information on how to become involved with releasing the biocontrol agent

Lightning Ridge Bowls Club
Tuesday 4 Feb 2020, 9.00am
or
Cumborah Community Hall
Friday 7 Feb 2020, 9.00am
or
The Club In The Scrub
Saturday 8 Feb 2020, 9.00am

Please RSVP by Friday 31 January to Jo Skewes at nwcactus@nsla.net.au or 0402 014 769
Places are limited!

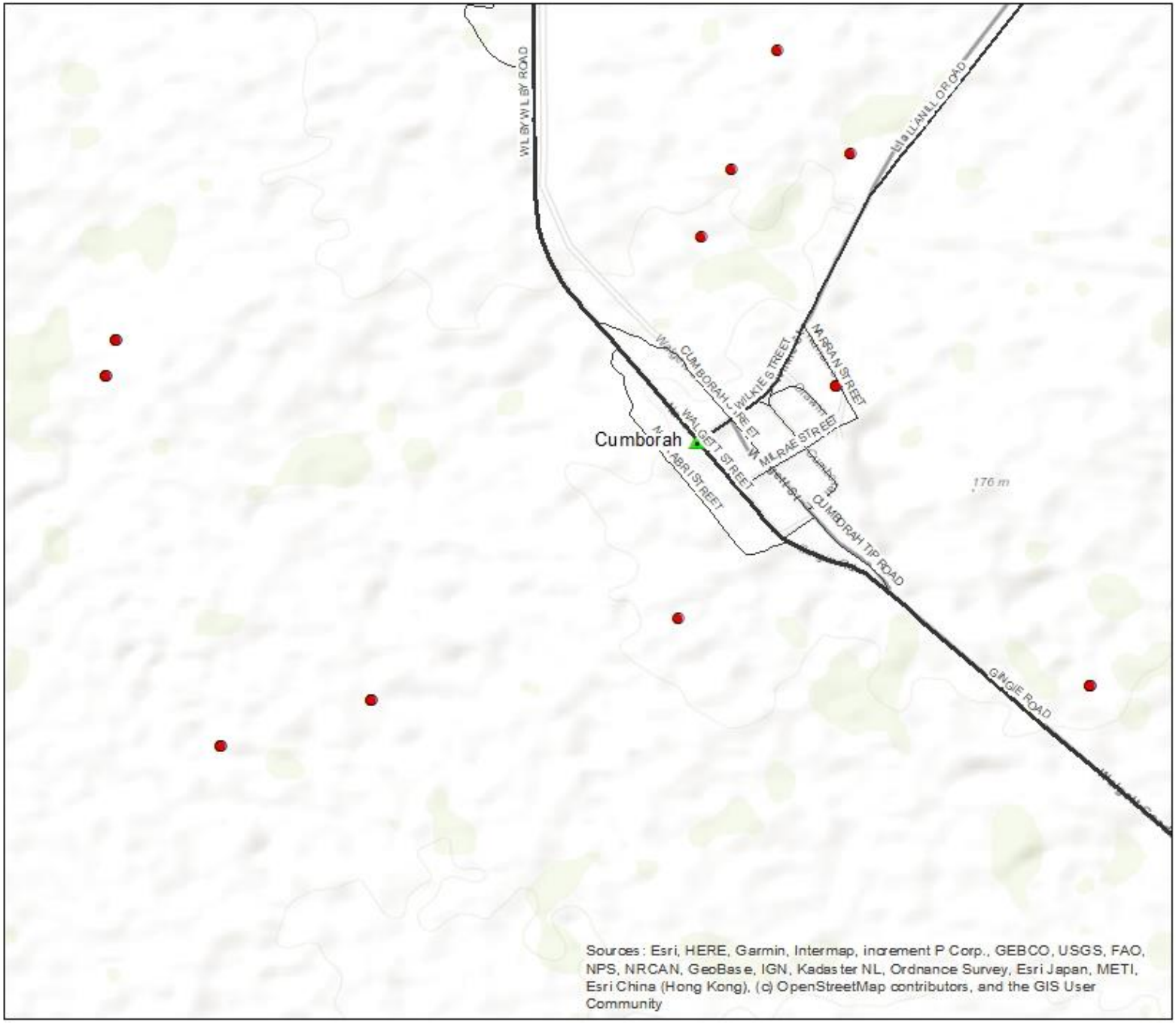
Releasing the Hounds on Hudson pear - a Community Biological control management program, funded through the NSW Governments Office for Environment and Heritage.

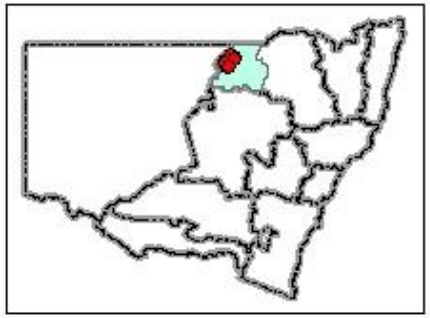
NSW GOVERNMENT

Northern Slopes Landcare Association Inc.

CASTLEREAGH MACQUARIE COUNTY COUNCIL WEED CONTROL

Biocontrol Release Sites for Hudson pear, C. pallida - Cumborah 2018 - 2020





Legend

- Towns
- Hudson pear, C. pallida (D. tomentosus ('califonica var. parkeri')
- Arterial Road

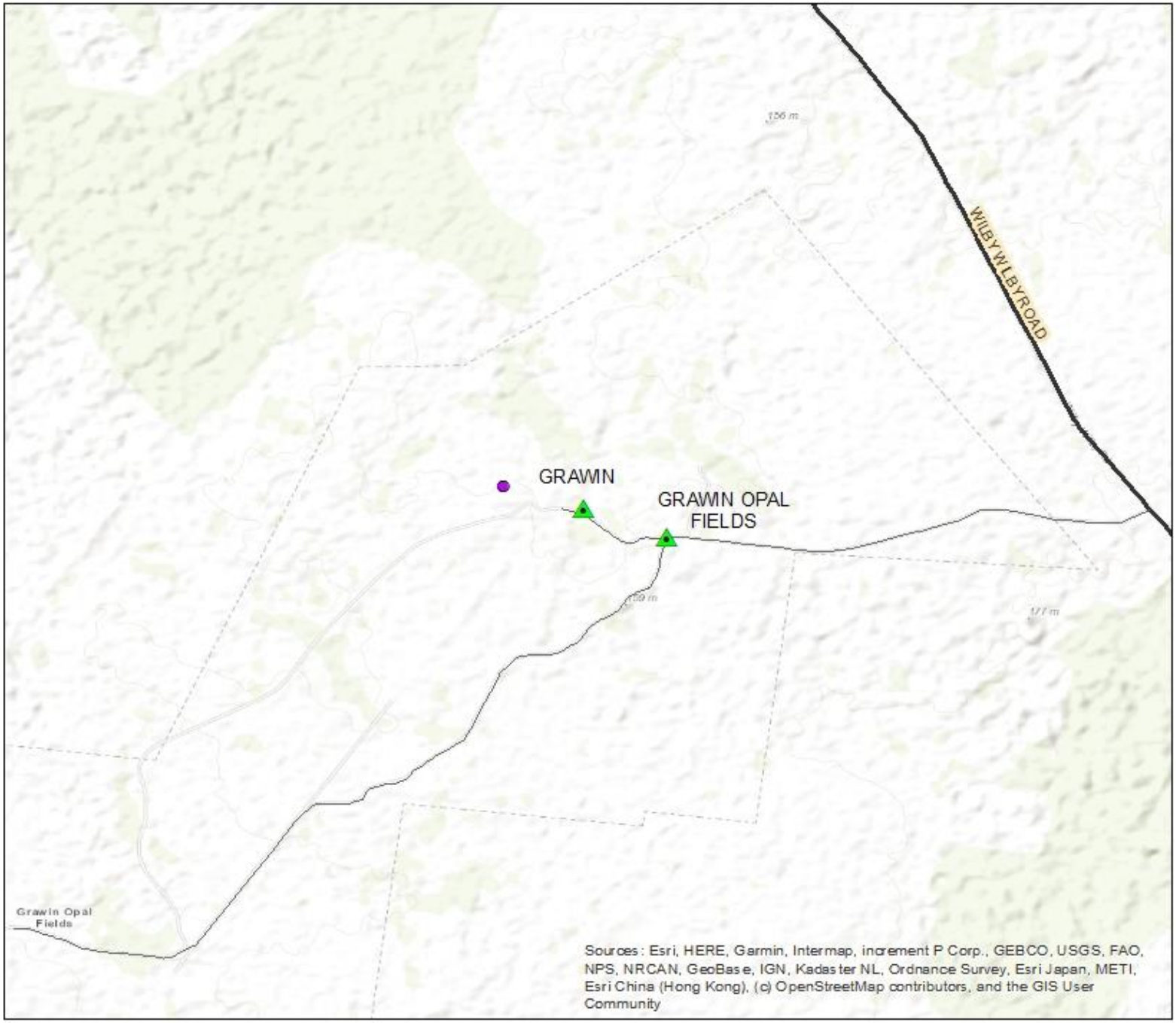
Project Reference
"Releasing the Hounds on Hudson pear" - a Community biological control management program. A collaboration between NSW Department of Primary Industries, North West Local Land Services, Northern Slopes Landcare Association and Castlereagh Macquarie Weeds County Council funded through the NSW Governments Office for Environment and Heritage.

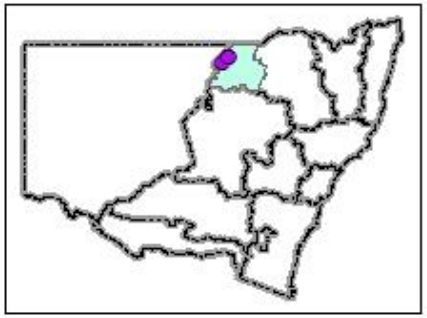
Kilometers
0 0.2 0.4 0.6 0.8

Map by: A. Bielke, North West Local Land Services
Date: 18/11/2020
Scale: 1:21,003 when printed at A4 size

NSW GOVERNMENT
CASTLEREAGH MACQUARIE COUNTY COUNCIL WEED CONTROL
Northern Slopes Landcare Association Inc.

Biocontrol Release Sites for Hudson pear, C. tunicata - Grawin 2019 - 2020





Legend

- Towns
- Brown Spine, D. tomentosus ('acanthocarpa var echinocarpa') on C. tunicata
- Arterial Road
- Local Road

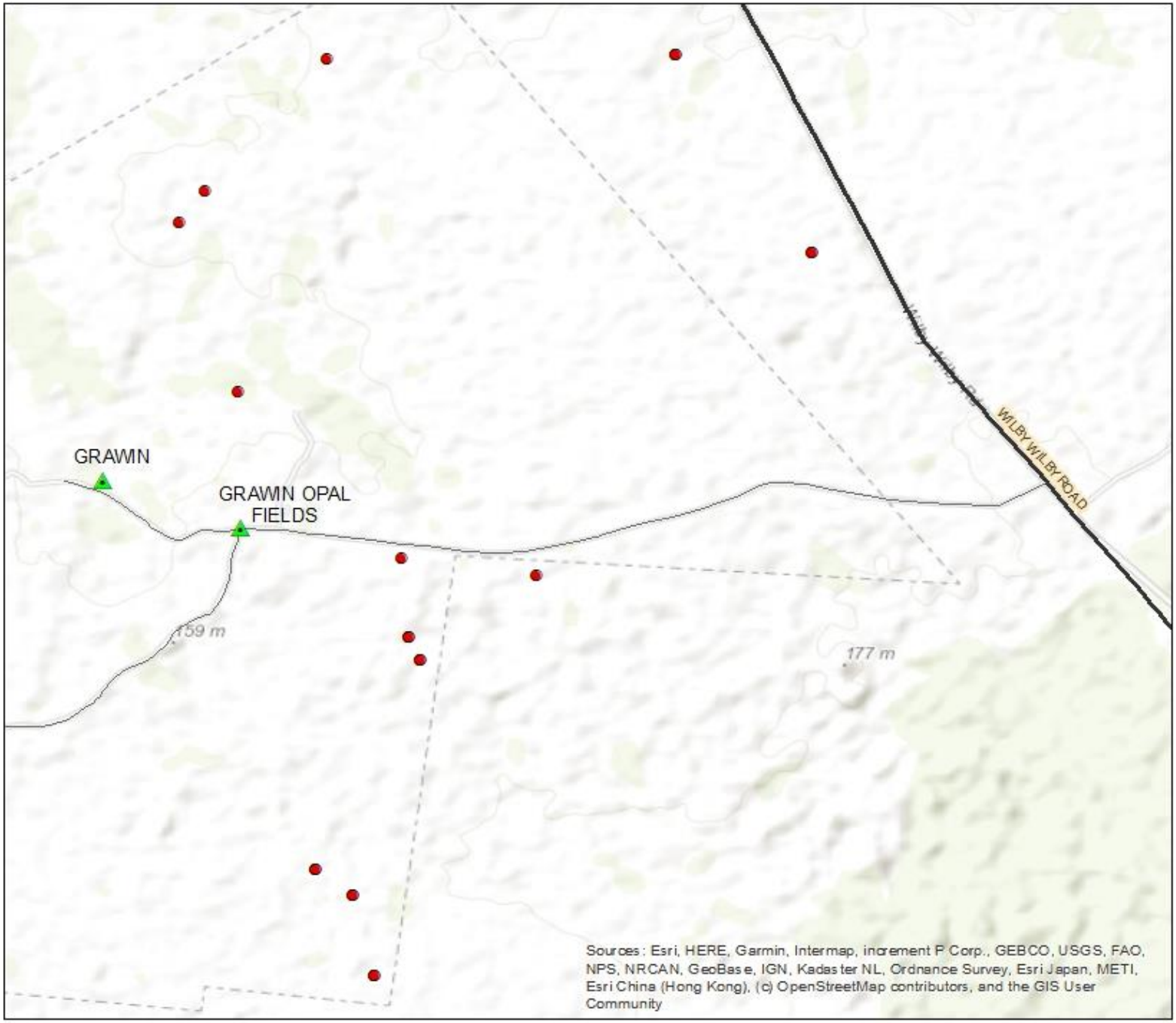
Project Reference
"Releasing the Hounds on Hudson pear" - a Community biological control management program. A collaboration between NSW Department of Primary Industries, North West Local Land Services, Northern Slopes Landcare Association and Castlereagh Macquarie Weeds County Council funded through the NSW Government's Office for Environment and Heritage.

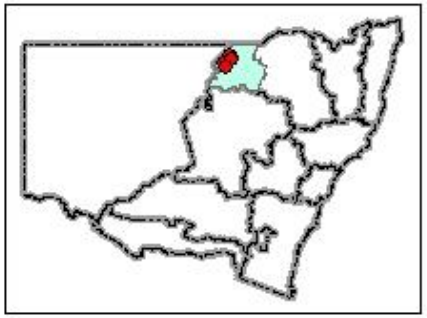
Kilometers
0 0.6 1.2 1.8 2.4

Author: A. Belka, North West Local Land Services
Date: 16/11/2020
Scale: 1:20,000 when printed at A4 size

NSW GOVERNMENT
CASTLEREAGH MACQUARIE COUNTY COUNCIL WEED CONTROL
Northern Slopes Landcare Association Inc.

Biocontrol Release Sites for Hudson pear, C. pallida - Grawin 2018 - 2020





Legend

- Towns
- Hudson Pear, C. pallida D. tomentosus ('califonica var. parkeri')
- Arterial Road
- Local Road

Project Reference

"Releasing the Hounds on Hudson pear" - a Community biological control management program. A collaboration between NSW Department of Primary Industries, North West Local Land Services, Northern Slopes Landcare Association and Castlereagh Macquarie Weeds County Council funded through the NSW Government's Office for Environment and Heritage.

Kilometers

0 0.35 0.7 1.05 1.4

Author: A. Belka, North West Local Land Services

Date: 16/11/2020

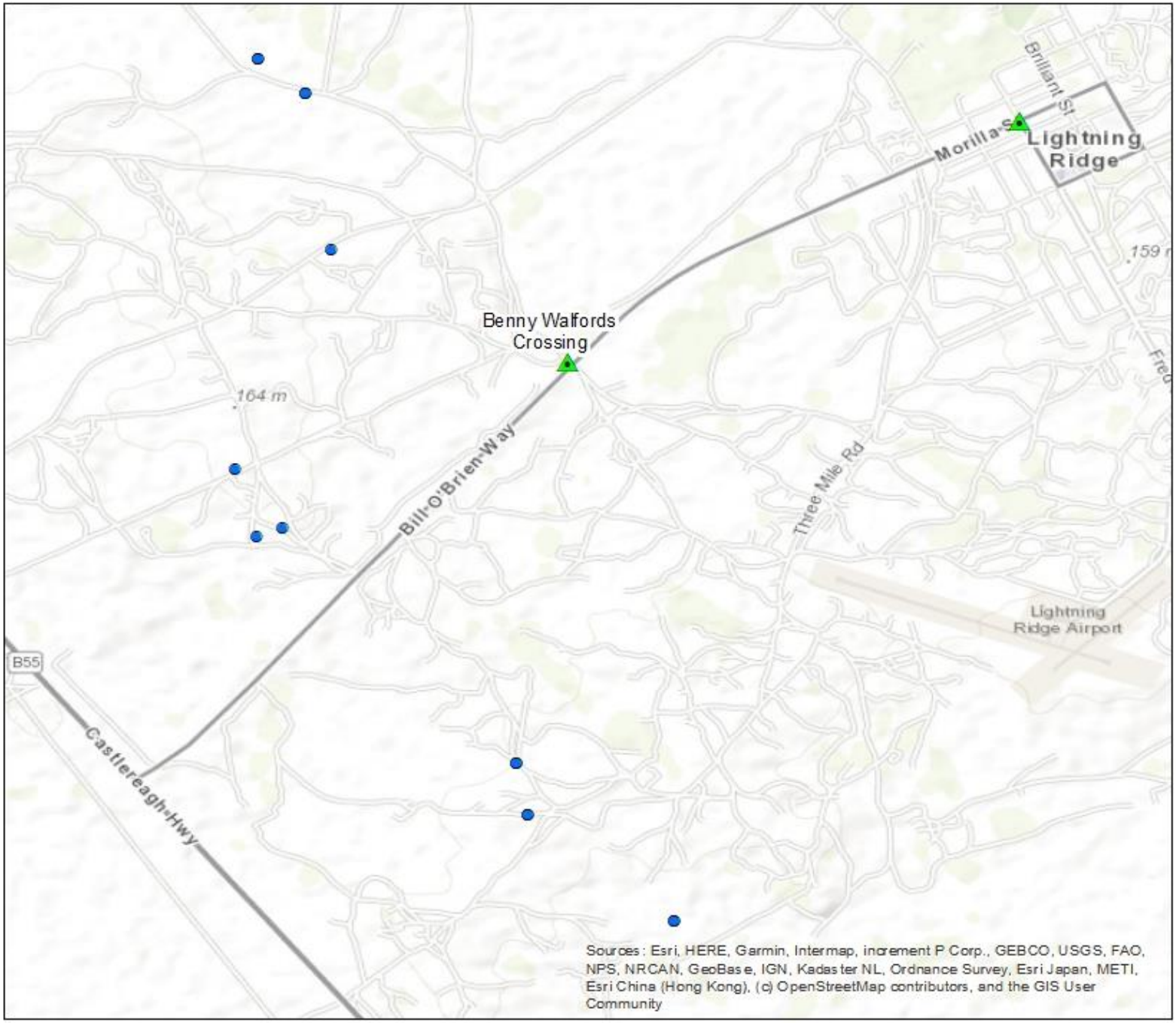
Scale: 1:40,000 when printed at A4 size

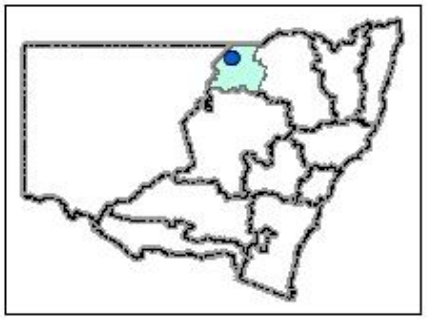
NSW GOVERNMENT

CASTLEREAGH MACQUARIE COUNTY COUNCIL WEED CONTROL

Northern Slopes Landcare Association Inc.

Biocontrol Release Sites for Jumping Cholla, C. prolifera - Lightning Ridge 2018 - 2020





Legend

- Towns
- Jumping Cholla, C. prolifera D. tomentosus ('califonica var. parkeri')

Project Reference

"Releasing the Hounds on Hudson pear" - a Community biological control management program. A collaboration between NSW Department of Primary Industries, North West Local Land Services, Northern Slopes Landcare Association and Castlereagh Macquarie Weeds County Council funded through the NSW Governments Office for Environment and Heritage.

N

0 0.35 0.7 1.05 1.4 Kilometers

Author: A. Belka, North West Local Land Services

Date: 16/11/2020

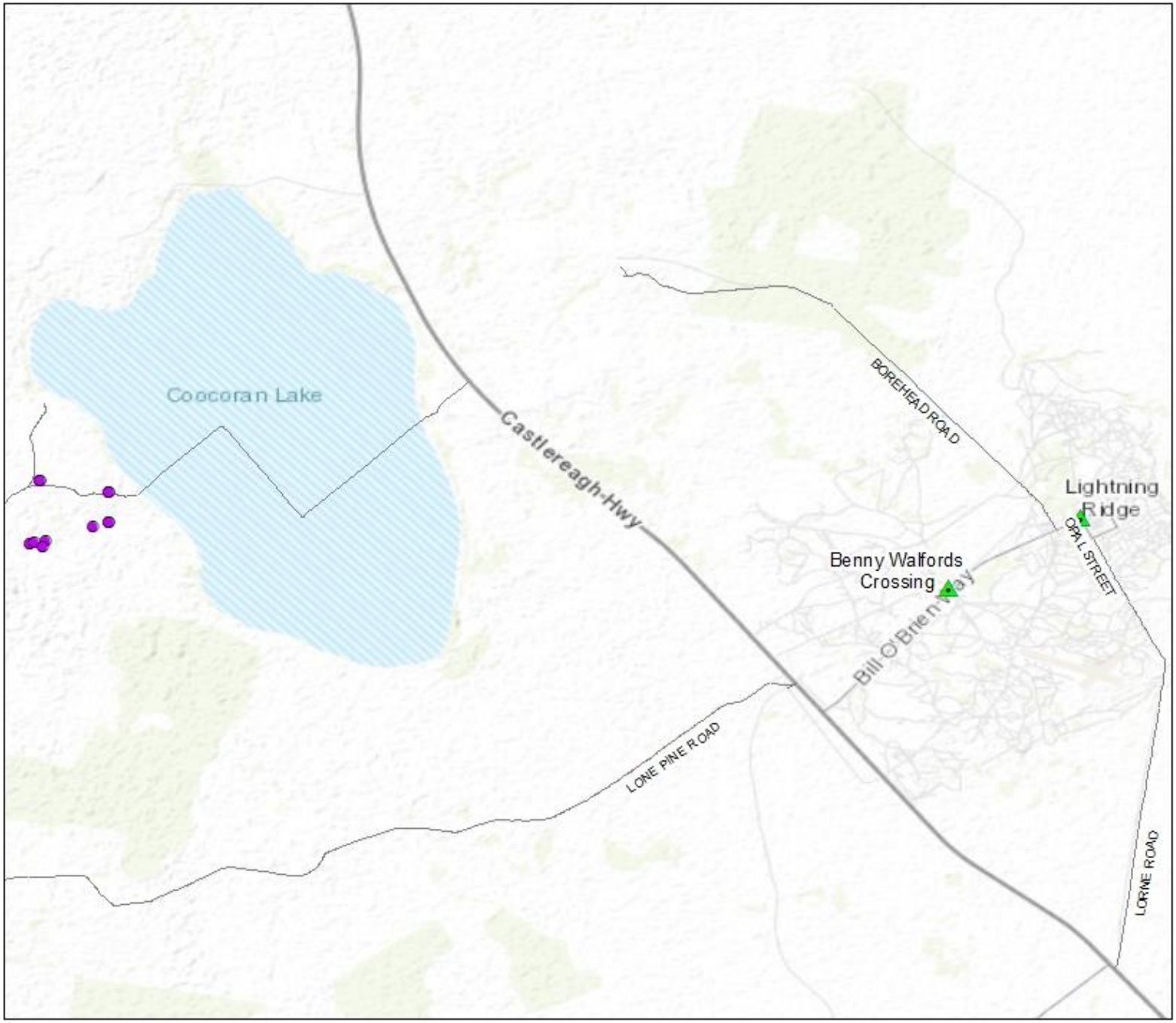
Scale: 1:30,000 when printed at A4 size

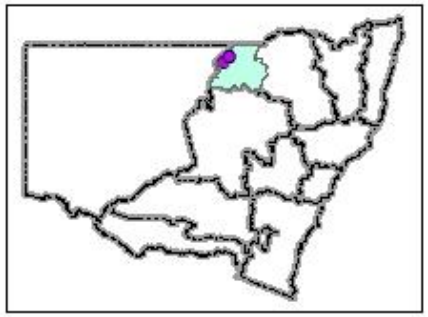
NSW GOVERNMENT

CASTLEREAGH MACQUARIE COUNTY COUNCIL WEED CONTROL

Northern Slopes Landcare Association Inc.

Biocontrol Release Sites for Hudson pear, C. tunicata - Lightning Ridge 2019 - 2020





Legend

- Towns
- Brown Spine, C. tunicata
- D. tomentosus ('acanthocarpa var echinocarpa')
- Local Road

Project Reference
"Releasing the Hounds on Hudson pear" - a Community biological control management program. A collaboration between NSW Department of Primary Industries, North West Local Land Services, Northern Slopes Landcare Association and Castlereagh Macquarie Weeds County Council funded through the NSW Governments Office for Environment and Heritage.

N

0 0.5 1 2 3 4 Kilometers

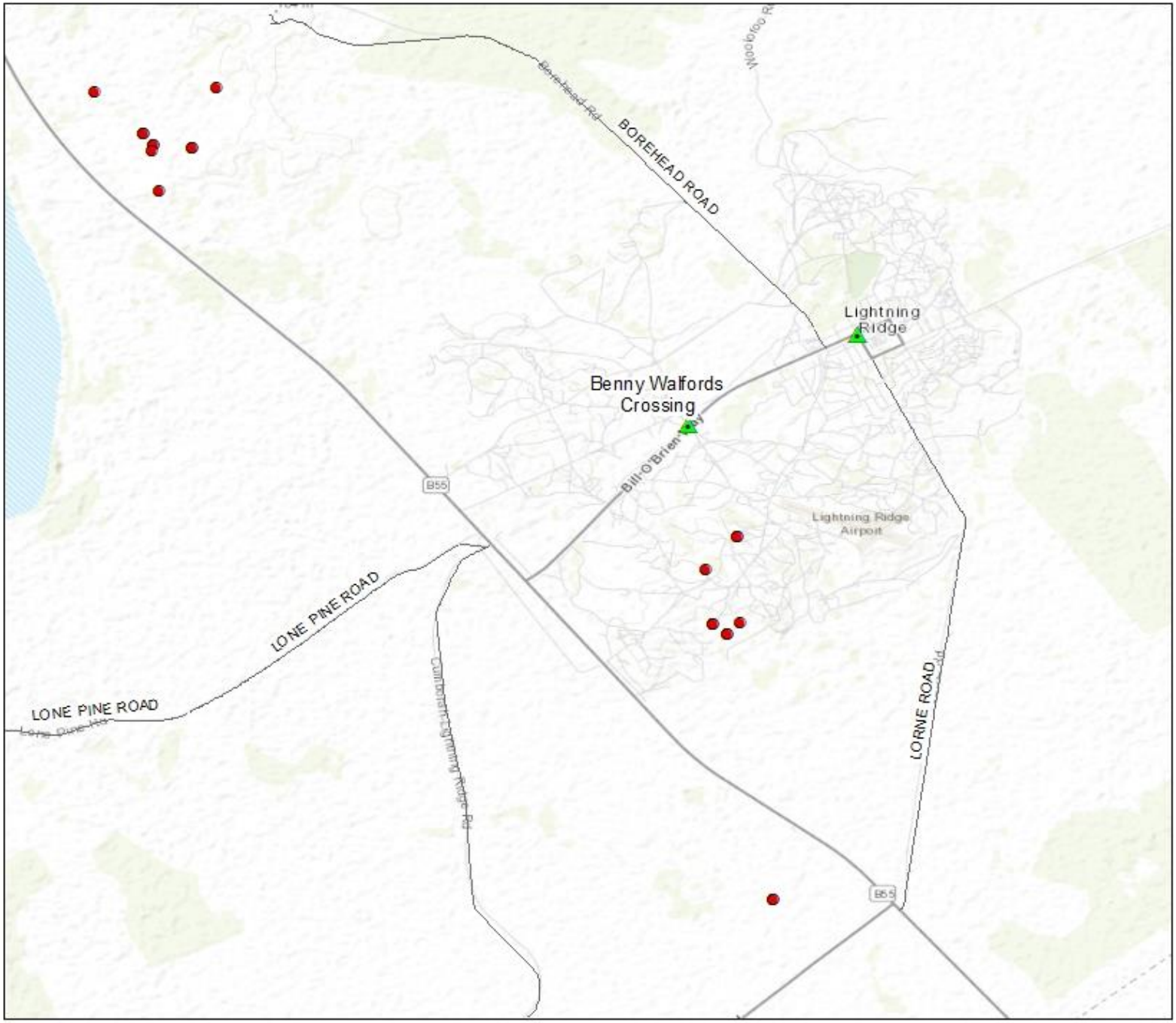
Author: A. Betka, North West Local Land Services
Date: 18/11/2019
Scale: 1:102,504 when printed at A4 size

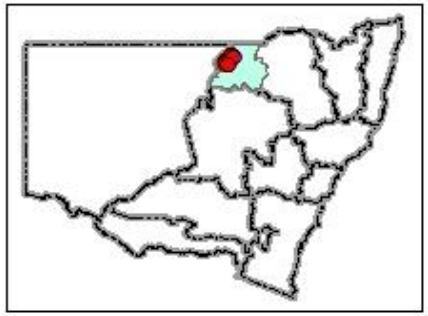
NSW GOVERNMENT

CASTLEREAGH MACQUARIE COUNTY COUNCIL WEED CONTROL

Northern Slopes Landcare Association Inc.

Biocontrol Release Sites for Hudson pear, C. pallida - Lightning Ridge 2018 - 2020





Legend

- Towns
- Hudson Pear, C. pallida D. tomentosus ('califonica var. parkeri')
- Local Road

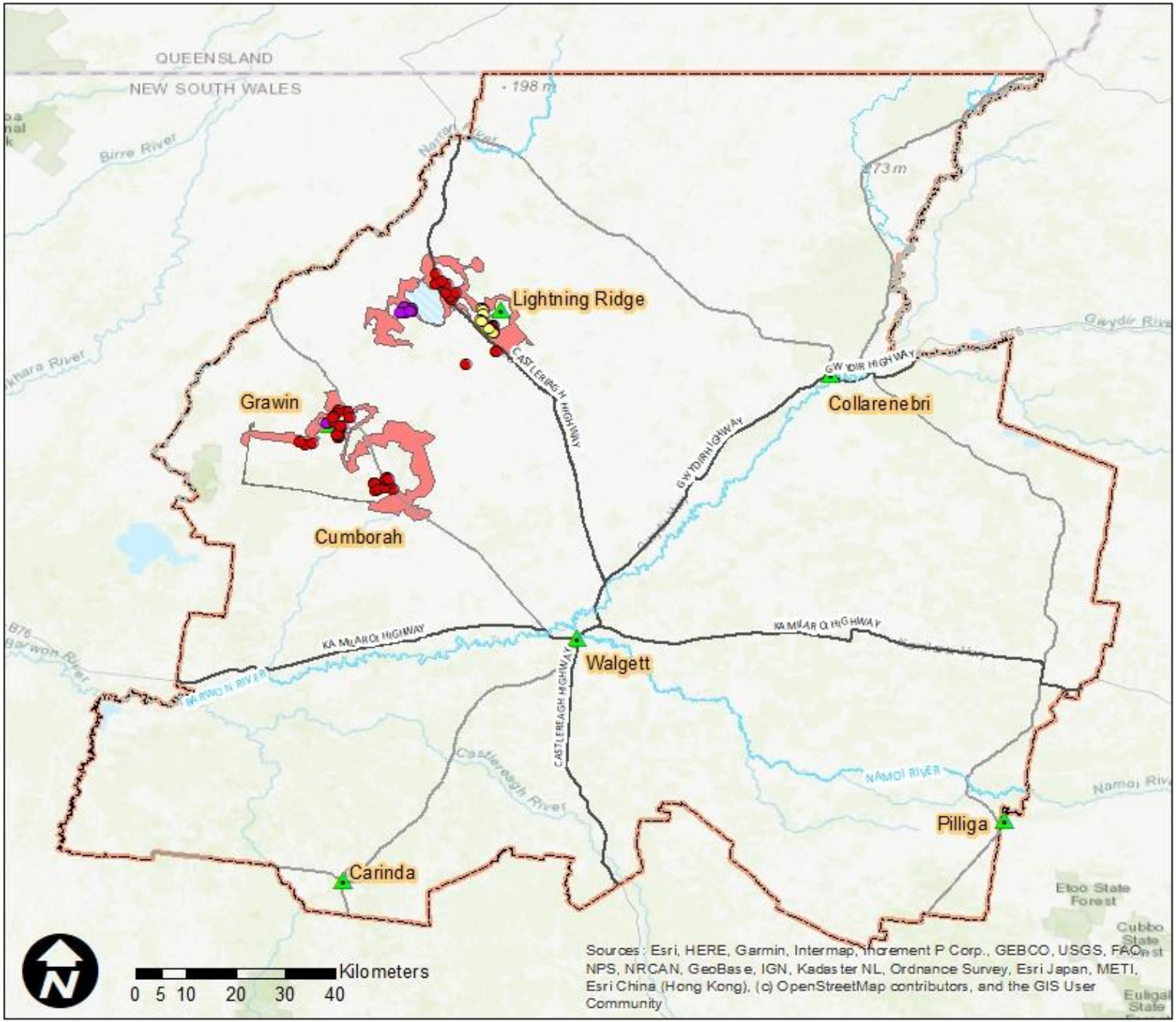
Project Reference
"Releasing the Hounds on Hudson pear" - a Community biological control management program. A collaboration between NSW Department of Primary Industries, North West Local Land Services, Northern Slopes Landcare Association and Castlereagh Macquarie Weeds County Council funded through the NSW Governments Office for Environment and Heritage.

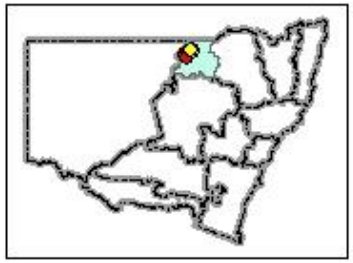
Kilometers
0 0.85 1.7 2.55 3.4

Author: A. Betka, North West Local Land Services
Date: 18/11/2020
Scale: 1:80,000 when printed at A4 size

NSW GOVERNMENT
CASTLEREAGH MACQUARIE COUNTY COUNCIL WEED CONTROL
Northern Slopes Landcare Association Inc.

Biocontrol Release Sites on C. pallida, C. tunicata, C. prolifera - Walgett Shire 2018 - 2020





Legend

- Towns
- Jumping Cholla, C. prolifera (D. tomentosus ('califonica var. parkeri')
- Hudson pear C. pallida (D. tomentosus ('califonica var. parkeri')
- Hudson pear C. tunicata (D. tomentosus ('acanthocarpa var echinocarpa')
- Rivers
- Highways
- Major Roads
- Walgett Shire Boundary
- Proposed Core containment zone

Project Reference

"Releasing the Hounds on Hudson pear" - a Community biological control management program. A collaboration between NSW Department of Primary Industries, North West Local Land Services, Northern Slopes Landcare Association and Castlereagh Macquarie Weeds County Council funded through the NSW Governments Office for Environment and Heritage.

Map by: A. Betka, North West Local Land Services
Date: 16/11/2020
Scale: 1:1,091,581 when printed at A4 size

NSW GOVERNMENT

CASTLEREAGH MACQUARIE COUNTY COUNCIL WEED CONTROL

Northern Slopes Landcare Association Inc.

MASS-REARING FACILITY

OPEN

Come and get your cochineal

Do you have Hudson pear on your property or mining claim?

The new biocontrol mass-rearing facility at Lightning Ridge is stocked with the Hudson pear cochineal and they are ready to be released.

Contact **Mat Savage** on **0427 253 463** to collect your plastic tub (for collecting clean Hudson pear segments - no ants or soil).
Swap your tub of clean segments for a tub of cochineal-infected segments. Mat will advise you on how to release the cochineal and record the release data.

Releasing the Hounds on Hudson pear - a Community Biological control management program, is funded through the NSW Governments Office for Environment and Heritage and the Department of Regional NSW. The research arm of the program is supported by AgriFutures Australia (Rural Industries Research and Development Corporation), through funding from the Australian Government Department of Agriculture, as part of its Rural R&D for Profit program (PRJ-012378).

NSW GOVERNMENT

CASTLEREAGH MACQUARIE COUNTY COUNCIL WEED CONTROL

Northern Slopes Landcare Association Inc.

Media release

28 October 2020

Immediate release

Hudson pear biocontrol agent available at Lightning Ridge mass-rearing Facility

Do you have Hudson pear on your property or mining claim?

Come and get your cochineal! The new biocontrol mass-rearing facility at Lightning Ridge is fully stocked with the Hudson pear cochineal and they are ready to be released.

Your friendly weeds officers, Mat Savage and Dave Ryan, will be only too happy to help you access your plastic tub for collecting clean Hudson pear segments. Then all you have to do is swap your tub of clean segments for a tub of cochineal-infected segments. Mat and Dave will guide you through the process of how to release the cochineal and record the release information.

The biocontrol agent for Hudson pear (*Cylindropuntia pallida*), a cochineal bug (*Dactylopius tomentosus* 'californica var. parkeri' lineage*)* is one of six lineages which are being used to manage the eight invasive *Cylindropuntia* spp. in Australia.

Through collaboration between Department of Primary Industries' Senior Research Scientist Andrew McConnachie, Walgett Shire Council Weed Officers Mat Savage and Andrea Fletcher, North West Local Land Service Regional Weed Officer Pete Dawson and Northern Slopes Landcare NW Cacti Control Coordinator Jo Skewes, a program has been created that delivers an effective on-ground weed management approach. This is just another tool in the toolbox to help control the core infestations of Hudson pear.

Resources have also been developed to help guide the community to correctly identify the invasive Hudson pear, create awareness around how to travel through the area without spreading it, and how to integrate the various control tools (chemical, biocontrol and manual removal) on their mining claim or property. Check out the Northern Slopes Landcare website for more details.

To find out more about getting your hands on the biocontrol agent for Hudson pear, contact Walgett Shire Weed Officer Mat Savage on 0427 253 463 or more on the resources available contact NW Cacti Control Coordinator Jo Skewes on 0402 014 769.

'Releasing the Hounds on Hudson pear - a Community Biological Control Management Program', is funded through the NSW Governments Office for Environment and Heritage and the Department of Regional NSW. The research arm of the program is supported by AgriFutures Australia (Rural Industries Research and Development Corporation), through funding from the Australian Government Department of Agriculture, as part of its Rural R&D for Profit program (PRJ-012378).

Media release

Resources

- Hudson pear You Tube videos - https://www.youtube.com/watch?v=8yNhOKsrTac&list=PLmSrgp-AUIktRkaObd2twzqzkuYlR t u4W
- Seen This Plant? Hudson pear - https://www.northernslopeslandcare.com.au/images/Cacti/SeenThis_HudsonPear_HIGHRes.pdf
- Biological Control of Hudson pear - https://www.northernslopeslandcare.com.au/images/Cacti/CochinealBiocontrol_Hudsonpear_HIGHRes.pdf
- Come clean, go clean - https://www.northernslopeslandcare.com.au/images/Cacti/TourismCacti_DLfolded_HIGHRes.pdf
- Invasive cacti in the north west region of NSW - https://www.northernslopeslandcare.com.au/images/pdf/cacti/5533_WONS_Poster_1810_Web.pdf
- Invasive cacti field guide - https://www.northernslopeslandcare.com.au/images/Cacti/5537_Cacti_Booklet_VeryFINAL_WEB.pdf

Image 1: Mat Savage and Andrea Fletcher (left to right) in the mass-rearing facility, Lightning Ridge.

Image 2: Dactylopius tomentosus ('californica *var* parkeri' lineage*), Dr Andrew McConnachie*

Image 3: Hudson pear, Cylindropuntia pallida, Michael Whitney

Ends