Hort Innovation

MT16004: Cape York & Torres Strait Biosecurity

A scoping study undertaken on behalf of the Australian vegetable industry and nursery & garden industries.

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Plant Health AUSTRALIA

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Australian Government
Department of Agriculture and Water Resources

Overview

This report describes engagement and extension activities undertaken on the Cape York Peninsula and in the Torres Strait as a part of the Hort Innovation investment MT16004: *Preparedness RD&E for the vegetable leafminer*.

It includes assessment of emerging pest transmission pathway risks for Australian horticultural industries and suggests methods to support continuing engagement in the region for the purpose of reducing the risk of exotic pest spread to production regions.

Abbreviations

FNBZ 1 – Far Northern Biosecurity Zone 1

FNBZ 2 – Far Northern Biosecurity Zone 2

NAQS – Northern Australia Quarantine Strategy

NPA – Northern Peninsula Area

NPARC – Northern Peninsula Area Regional Council

TSRA – Torres Strait Regional Authority

TSIRC – Torres Strait Islands Regional Council

QDAFF – Queensland Department of Agriculture, Fisheries, and Forestry

VLM – Vegetable leafminer

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Executive Summary

All Australian commercial production regions that grow vegetable leafminer (*Liriomyza sativae:* VLM) hosts, of which there have been over 300 identified, are at risk from this exotic pest and it is likely that growers in these regions will be required to actively manage it in the future. At the time of writing, VLM was contained to a small area on the mainland, at the town of Seisia on the Cape York Peninsula – a region that is well known as being at the frontline of biosecurity in Australia.

Cape York Peninsula and the Torres Strait region is a natural north-south pathway for exotic pests moving from South East Asia, with the vegetable leafminer being one example that has moved southbound along the Torres Strait islands and into the Cape. While the region is high risk for exotic pest incursions is also has high value as a buffer zone between Papua New Guinea and major horticultural regions in Australia.

The region is currently undergoing major changes. Tourism is a rapidly growing sector, an influx of funding is leading to major infrastructure initiatives, and regional biosecurity legislation has recently been updated.

This report details engagement and extension activities on the Cape York Peninsula and in the Torres Strait undertaken by AUSVEG, in collaboration with cesar, over 8 May-23 May 2018 and undertaken as a sub-component of MT16004.

This engagement visit allowed the project team to meet Cape York and Torres Strait locals, including community leaders, undertake initial discussions about the impact of exotic pests in the region, and learn about the biosecurity challenges and needs in these communities.

This report provides Hort Innovation, and associated levy payers with a snapshot of Cape York and Torres Strait biosecurity arrangements and provides insights into emerging biosecurity risks, such as increasing tourism in the region, that may have a future impact on horticultural production regions.

Finally, the report makes recommendations for investigating mutually beneficial collaborations between Australian horticultural industries and far northern communities and initiatives, for the purpose of supporting good biosecurity practices, and encouraging pest reporting in Cape York and the Torres Strait.

Scope and Activity Summary

Report scope

At a project level, MT16004 (Preparedness RD&E for the vegetable leafminer) aims to raise awareness and management knowledge of vegetable leafminer (VLM) among vegetable and nursery growers to aid smooth and fast adoption of best management practices for control of this new pest. Cape York Peninsula and Torres Strait communities are either already observing damage caused by VLM or are in close proximity to affected regions. To limit its impact on already affected communities and slow its spread further south the MT16004 project team was tasked with raising awareness and management knowledge of VLM among these communities.

This MT16004 project component involved conducting one engagement mission to Seisia (Cape York Peninsula) in year 2 of the project, as well as deliver training in VLM control based on project R&D outcomes in year 3 of the project. In order to ensure legacy of engagement mission findings, findings from the year 2 trip were included in this report to Hort Innovation for the benefit of the Nursery & Garden Industry, and the Vegetable Industry. Readers of the report will notice that it contains background on the region – this is information that the author deemed important to include, in order to appropriately contextualise findings and recommendations.

This report endeavours to answer the following questions:

1. What are the major pathways that may facilitate exotic plant pest transmission south into production regions?
2. What are the emerging risks that may impact on maintaining biosecurity in the region?
3. What are the current biosecurity initiatives and organisations in the region, and is there an opportunity for Australian horticultural industries to collaborate on biosecurity activities?
4. What are the current plant pest best management practices (BMPs) used in Torres Strait and Cape York communities? Is there an opportunity for Australian horticulture professionals to provide training in BMPs for plant pests?

To this end, engagement mission activities included:

1. Undertaking extension activities to raise awareness about VLM in the region with communities – particularly with councils, schools, and business owners in the tourism sector;
2. Meeting community leaders and horticultural personnel in Cape York and the Torres Strait to develop relationships, brief them on the risk posed by VLM, and learn about current biosecurity initiatives;
3. Undertaking extension activities to raise awareness about VLM in the region with tourists; and
4. Surveying tourists to better understand the biosecurity risk posed by travellers to the Torres Strait.

Engagement and extension work undertaken by the MT16004 project team has laid foundations for building collaborative biosecurity relationships between this important region and production industry stakeholders. This report aims to inform and guide future Nursery & Garden Industry, and Vegetable Industry engagement in Cape York Peninsula and the Torres Strait.

Itinerary

Between 8 May and 21 May 2018 Dr Jessica Lye (AUSVEG) and Dr Elia Pirtle (cesar) travelled from Cairns, QLD, to Thursday Island in the Torres Strait (Table 1). The journey was undertaken by car and ferry, to allow VLM host plants to be surveyed for the presence of the pest during the journey up Cape York Peninsula and on Torres Strait Islands. The region map, with the route and islands visited for VLM surveillance are displayed in Figure 1.

Table 1. Engagement mission itinerary

Dates	Locations
8–10 May	Cairns, Lakeland, Cooktown, Coen, Weipa, Bramwell Junction.
11–14 May	New Mapoon, Injinoo, Seisia, Roko Island, Albany Island, Zuna Island.
15–17 May	Thursday Island and Horn Island.
18–21 May	Seisia and Loyalty Beach (cesar researcher remained in the Torres Strait for further surveillance activities)

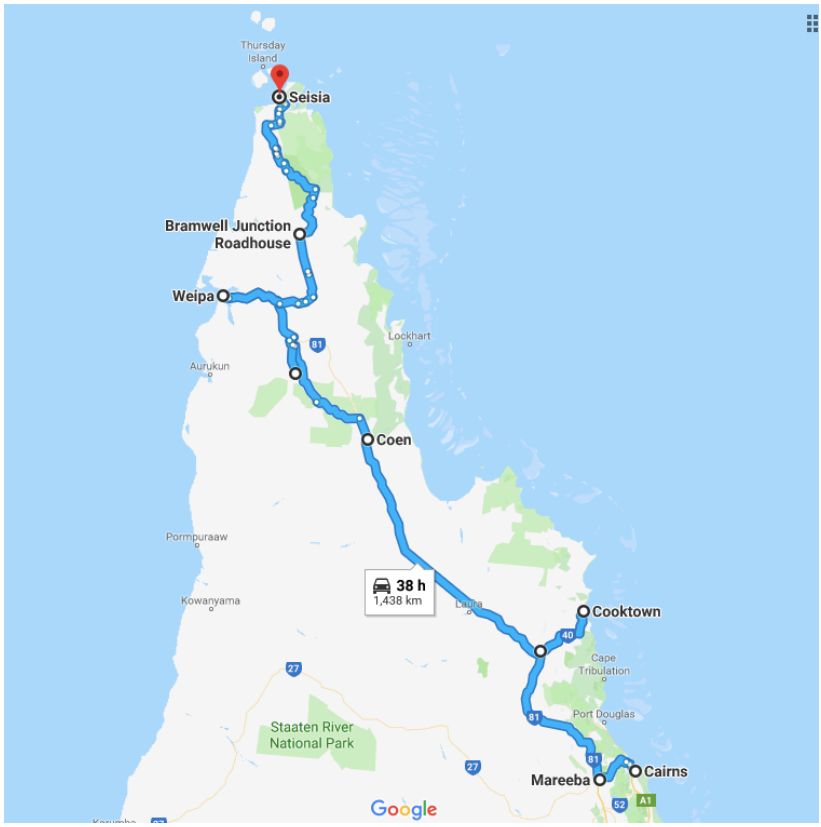

Figure 1. Route followed from Cairns to Seisia (above) and islands surveyed in the Torres Strait for VLM (below, yellow pins), and Thursday Island in the Prince of Wales island group (below, top left of map)

Extension resources

During the trip the project team conducted a number of VLM awareness raising activities with business owners, schools, councils, and tourists throughout Cape York Peninsula. Several resources had been developed for use during the trip to aid extension activities. They are described below.

- Laminated information stakes were staked into communal gardens at campsites, schools, and in shared spaces within the community in regions where VLM had not been detected. The information stake describes the symptoms of VLM infestation and encourages reporting for the purpose of tracking VLM spread (Figure 2).
- Project flyers and VLM awareness flyers were handed out during briefings, as well as laminated A3 awareness posters.
- A school colouring handout, which educates children about VLM and what it likes to eat was supplied to the Cape York Peninsula Biosecurity Centre, and schools in Weipa, Thursday Island, Horn Island, and Bamaga.
- A 'mock surveillance' activity, with guidelines for use, was handed out at schools visited in the Cape, and the activity was undertaken at one school (Figure 2).

Figure 2. Extension resources used during the trip – information stake (top left), tourist survey information sheet (top right), mock surveillance materials (bottom)

Extension and engagement activities

Table 2. Meetings, contacts made, insights, and extension activities (including follow up activities) undertaken during this engagement mission

Day & location	Activity	Connections	Insights	Follow up activities
Day 1: **Cairns & Lakeland**	○ VLM presentation to Lakeland Progress Association. ○ Supplied association with poster and fliers.	Lakeland Progress Association: Stephanie O'Kane (Executive Officer, Lakeland Progress Association), Martin Garadi (Grower), Martin Arnold (Grower), Shaun Jackson (Grower), John Lorenzo (Grower).	Approx. 10 commercial growers in the area, growing a mix of watermelon (often for export), eggplant, passionfruit, cucumber, and banana. The Lakeland washdown station was recently decommissioned due to costs to keep it running. There are plans to build a tourist information centre in Lakeland although there is no timeframe for this.	AUSVEG sent the association a project article for use in their newsletter.
Day 2: Cooktown and Lakeland	○ VLM briefing for Cooktown biosecurity officers. ○ VLM briefing for Cape York NRM extension officer. ○ Lakeland grower visits – surveillance and briefings. ○ Lakeland primary school visit and briefing for principal. ○ VLM briefing to owner of Lakeland Tourist Park.	Cook Shire Council: Cathy Johnson (Senior Biosecurity Officer) and Darryn Higgins (Biosecurity Officer). Prior connection had been made with Dean Schreike (Biosecurity Officer). Cape York NRM: Natasha Reid (Industry Development). Prior conversations had been	Cooktown area has many small hobbyist growers, mainly organic, and they sell each Saturday at the market. In future, if anyone from the project comes to visit again they should attend the market to speak to the growers. None of the growers or other community members we spoke to had heard of VLM. The Lakeland primary school principal was	AUSVEG sent the VLM activity pack in e-copy to the primary school. AUSVEG sent Cook Shire Council a VLM weed host list so they may keep an eye out for damage while controlling weeds.

	○ Supplied all visited with posters and fliers. ○ Supplied tourist park and primary school with an awareness stake for their gardens. ○ Supplied school with VLM activity pack.	conducted with Michael Goddard (Gully and Grazing Project Officer), and Will Higham (Program Manager). Lakeland Primary School: Lauren O'Malley (Principal)	highly supportive, since most children at the school have parents involved in growing.	AUSVEG sent Cape York NRM e-copies of the project flyers, and a VLM PPT for use during grower meetings.
Day 3: Coen and Weipa	○ VLM briefing for Cape York Peninsula Biosecurity Centre Manager. ○ VLM briefing for Outback Spirit tour operators in training. ○ VLM briefing for Weipa caravan park owners. ○ VLM briefing for Weipa Town Authority. ○ Supplied all new connections with poster and fliers.	Cape York Peninsula Biosecurity Centre: Scott Templeton (Biosecurity Compliance, QDAF) Weipa Town Authority: Judey Brown (Coordinator, Communities), Michael Rowland (Chair)	The Inspection Centre used to be at Laura, then it moved to Coen. Since that time the car counter has shown a significant increase in travellers along the Peninsula Developmental Road. Weipa Town Authority and the Weipa caravan park owners were unaware of VLM but were happy to help distribute awareness material. The project team was invited to submit an article for the regional newspaper via the Weipa Town Authority.	AUSVEG sent the VLM activity pack in e-copy to the primary school. AUSVEG sent e-copies of flyers to WTA and an article for publication. AUSVEG sent a VLM article to the Cape York news for publication.
Day 4: Weipa	○ VLM briefing for Rio Tinto Land Rehabilitation team. ○ Canvassing of tourists at the Weipa Caravan Park. ○ VLM activity pack supplied to St Joseph's primary school. ○ Visit to grade 2 class at Western Cape College primary campus.	Rio Tinto: Harry Nevard (Land Rehabilitation Coordinator) Western Cape Primary: Samantha Blocksidge (Head of Curriculum)	Rio Tinto have a weed survey team and they keep a local weed list. Home owners had not heard of VLM. Pest control in Weipa home gardens is heavily organic and includes soap, detergent, neem oil, and milk.	*Western Cape College Primary subsequently wrote an article in the school newsletter about VLM and this visit.

	○ Students taken through the VLM colouring activity and mock surveillance activity. ○ VLM briefing for homeowners during surveillance visits at Weipa port.		Running a leafminer activity session at Western Cape College Primary School integrated well with the second-year course syllabus, in which they had been learning about insect lifecycles.	
Day 5: Weipa and Bramwell Junction	○ Canvassing of tourists at the Weipa Caravan Park. ○ Project fliers and an information stake were supplied to the owners of Weipa caravan park. ○ VLM briefing for manager of Moreton Telegraph Station. ○ VLM briefing for manager at Bramwell Station. ○ Each station was supplied with poster, fliers and information stakes.	Bramwell Station and Tourist Park: Ken Godfrey (Manager)	Most tourists canvassed at Weipa Caravan Park had not heard of vegetable leafminer but were interested to learn about it. All tourists canvassed were unaware of the updated Cape York Peninsula biosecurity zoning. Station employees were unaware of the vegetable leafminer but were willing to put awareness collateral on display.	
Day 6: Bramwell Junction and Seisia	○ Canvassing of tourists at Bramwell Station. ○ Bramwell Roadhouse supplied with poster, fliers and information stakes.		On the road to the Jardine Ferry crossing there was one biosecurity sign, approximately 1 km south of the crossing. It showed the old quarantine zone, denoting the zone as one single zone from Coen north to the tip. The river crossing personnel are currently not trained in biosecurity and have no powers under the act. There is a popular tourist destination, Fruit Bat Falls, which may be used as a good tourist information location in future.	

Day 7: Seisia, Bamaga and Injinoo	○ Meeting with Mayor Eddie Newman to discuss biosecurity challenges in the region. ○ Visit to NPA College where a presentation was made to the Year 7 agri-science students. ○ VLM briefing for Land and Sea Rangers (Injinoo). ○ Canvassing of tourists at Seisia Tourist Park. ○ All new connections supplied with posters fliers, and information stakes.	NPA State College: Harrison Artu (Farm Technical Officer) Seisia Enterprises: Arthur Wong (Owner) NPARC-Apudthama Rangers: Erra Bond (Operations Co-Coordinator) NPARC-Apudthama Rangers: Christo Lifu (Operations Co-Coordinator)	The NPARC is becoming very aware of biosecurity and the role the Jardine Ferry crossing may play in controlling traffic. The NPA has experienced incursions from the south, such as the expansion of the cane toad range. Gamba grass, which has spread north into the NPA, is also a problem pest and increases fire risk (see 'Further insights' section for more information). The NPA is home to a high number of free roaming horses, which could play a role in pest spread around the NPA. Many residents in the NPA keep chillies (a VLM host) in their gardens. Pest management practices in home gardens are largely organic. Roads leading north into the NPA from Coen are largely unsealed at the time of writing (see 'Entry and exit points' section for more information). NPA State College were very happy to receive a visit and it was suggested that the project team visit the college in the future to update the students and staff on project findings. The college NPA State College farm would be an ideal location for future VLM management workshops.
Day 8: Roko, Albany and Zuna Islands	○ VLM surveillance on islands. ○ Briefed island inhabitants. about identification of VLM ○ Island inhabitants given. contact information for the project team in case they observed any signs of VLM.		There was only one residence on each island surveyed. Inhabitants on these islands were interested to learn about VLM. One couple on Zuna island (where a putative VLM detection had been made on that visit) mentioning that their tomato plants had died out the previous year due to whitefly and leafminer.

			The couple on Zuna island was asked to refrain from transporting host material to the mainland.	
Day 9: Horn Island	○ VLM briefing for acting Principal at Tagai College Horn Island Primary Campus. ○ Supplied the campus with a pest UTE guide for northern pests, project poster and flier.	Tagai State College, Horn Island: Matthew Deady (Principle).	Horn Island Primary School Campus has a 'Harmony Garden', in which a diversity of VLM hosts had been planted: pumpkin, cucumber, tomato, marigolds. The garden displayed heavy VLM infestation and the Principal, who had not heard of VLM, was informed of this. This garden would be an ideal location for future VLM management workshops.	AUSVEG sent the VLM activity pack in e-copy to the primary school.
Day 10: Thursday Island	○ Visit to Tagai College, secondary campus and presentation to the students on exotic pests, biosecurity, and VLM. ○ VLM briefing for Torres Strait Island Regional Council (TSIRC) rangers.	TSIRC: Aken Akee (Environment Officer), Diana Russell (Town Planner), Bobby Bimawel (Pest Officer), Steven Sailor (Pest Officer) Tagai State College: Tim Hillier (Head of Department Land and Sea Management), Chris La Rosa (Secondary Biology Teacher)	The cane toad has become a major problem on Thursday Island, with a toad collecting competition being held every Friday by TSIRC. Several local connections made during the visit to Thursday Island mentioned that tomato and chilli plants in their gardens had been severely impacted by VLM (VLM damage was confirmed in at least one reported case). TSIRC officers were shown minute parasitoid wasps under the microscope to allay concerns about 'wasps' being advised for use in VLM control.	

Day 11: Thursday Island	○ VLM briefing for Torres Strait Regional Authority (TSRA)	TSRA: Mark Blair (Senior NRM Officer), George Savioka (Industry Development Officer)	TSRA runs a Sustainable Horticulture project throughout the Torres Strait (see section 'Regional extension initiatives' section for more information).	AUSVEG sent a VLM article to the Torres Strait newspaper for publication.
Day 12 and 13: Seisia and Loyalty Beach	○ Canvassing of tourists at Seisia Holiday Park and Loyalty Beach Campground and Fishing Lodge. ○ Briefing given to the managers of both tourist parks. ○ Fliers and information stakes were supplied at both parks.	Loyalty Beach Campground and Fishing Lodge: Pat Lennox (Owner)	Tourists and park managers were unaware of VLM but were very interested to learn about it. New VLM infestation found at the Seisia Tourists Park, in close proximity to where tourists were 'sunning' their basil plants (see 'Tourist survey' section for more information).	

Regional Analysis

Cape York Peninsula is the northern-most part of Australia, with a land area of approximately about 220,000 square km. It is made up of a number of regions, including Western Cape York (Weipa, Mapoon, Napranum & Aurukun), Eastern Cape York (Iron Range), Central Cape York (Hann River Roadhouse, Musgrave Roadhouse, Coen, Archer River, Moreton Telegraph Station, Bramwell Tourist Park, Bramwell Junction), and Lower Cape York (Bloomfield Track, Bloomfield, Wujal Wujal, Cooktown, Hopevale, Laura, Lakeland and Palmer River).

The peninsula is transected by the Jardine River, with the area north of the Jardine being surrounded by the Coral Sea to the east, the Gulf of Carpentaria and Arafura Sea to the west, and the Torres Strait (and islands) to the north.

The regional climate is tropical, monsoonal with a wet and dry season. Most rainfall can be expected between November and April, with average rainfall being 1700mm, and falling as heavy thunderstorms, monsoonal lows or tropical cyclones. Temperatures remain warm (18-30°C in the dry and 24-36°C during the wet).

Cape York Peninsula and the Torres Strait are perceived as being remote wildernesses with a high cultural and environmental value. The region is sparsely populated, with 7,513 people in Cape York and 4,514 people in the Torres Strait islands. However, this number increases substantially each dry season with influxes of tourists.

Rio Tinto operates the largest bauxite mine in the world out of Weipa. Therefore, a large portion of the land around Weipa is leased by Rio Tinto. Cattle stations are another major industry on the Cape, with the largest station being located at Bramwell.

Entry and exit points

The transport infrastructure servicing the region's remote communities is served by a primary north-south road access route, local access roads and air and marine facilities of various scales. There is a significant reliance on air and sea transport, particularly during the wet season when road closures are common.

There is a daily plane service (Qantas Link) between Cairns to Weipa, as well as a Qantas Link service between Horn Island to Cairns, with Horn Island being the only island within the Prince of Wales Island group to be flat enough to host an airstrip. There is also an airport serviced by SkyTrans in Coen, into which the Royal Flying Doctors service arrives each week, and an airport at Bamaga from which the Regional Express runs a regular passenger flight to Cairns.

While those listed above are the main methods of accessing or leaving the region by air, additional airports and landing strips are located at Aurukun Airport, Cooktown Airport, Pormpuraaw Airport, Kowanyama Airport, Lizard Island Airport, Lockhart River Airport, Northern Peninsula Airport, Weipa Airport, and RAAF Base Scherger.

After flying to Horn Island arrivees can then catch the MacDonalds water taxi to Thursday Island, the main tourism destination in the Torres Strait. Peddles Ferry is then the main method

of travelling from Thursday Island to Seisia on Cape York Peninsula. Many inhabited islands in Torres Strait also have airstrips suitable for light aircraft which can be accessed through regular passenger transport or charter flights.

The major point of entry by land is via the Mulligan Highway (228 km), which runs from Mareeba to Lakeland, and the Peninsula Developmental Road (524 km), which runs from Lakeland to Weipa.

Roads are sealed until Lakeland, after which there are sections of sealed and unsealed road until Coen. West and North of Coen is largely unsealed road that becomes rutted from increased road traffic over the course of the dry season and can be unusable during the wet season due to flooding.

There are several plans that outline intentions for improving road infrastructure on the Cape York Peninsula, which will in turn support economic growth, more tourism, and transport of produce. These are:

- Far North Queensland Regional Action Plan
- Cape York and Torres Strait Transport Infrastructure Plan
- Peninsula Developmental Road Investment Plan

Maintenance of highways on Cape York Peninsula is split between several local councils, which means that plans to seal the entire Peninsula-Development Road may progress disparately over the next few years.

Entry into Cape York Peninsula can also be gained by sea. There are five ports in the region, four of which are managed by the Far North Queensland Ports Corporation. The fifth, the Port of Weipa, is operated by North Queensland Bulk Ports Corporation. The Sea Swift barge is a major sea transporter of fresh produce from Cairns to the Cape York Peninsula and Torres Strait.

With a number tourism and infrastructure plans having been developed for the region in recent years, it is clear that increasing accessibility to the Cape is a focus for the state government and local governments.

Surveillance at entry points (Sea Swift Docks)

This trip involved VLM surveillance around the Sea Swift docks at Seisia, Weipa, Thursday Island, and Horn Island. Siratro (a VLM host plant) grows prolifically on fences surrounding each dock, which may aid establishment of the fly should it be transported on Sea Swift produce and blown to shore.

Crop production

The Lakeland region is the most northern commercial horticultural region in Australia and is classified as a priority agricultural area by the Queensland Government. Major crops are banana, sorghum, peanuts, with some pineapple, watermelon, and mixed solanaceous crops at a smaller scale also grown.

As a cropping region the Lakeland area is relatively free of many plant diseases found elsewhere in the state and is seen as a low risk option for growing high quality produce. Further, due to its placement on the intersection of the Mulligan Highway and the beginning of the Peninsula Developmental Road, Lakeland is the 'tourism gateway' to the Cape for those visitors travelling by road. The town is also experiencing a growing seasonal population of transient farm workers (mainly backpackers).

In 2018, the Lakeland Progress Association reported that there are ten horticultural producers in the area in close proximity to the town (Stephanie O'Kane, pers comms). The Lakeland Local Area Plan (2017) suggests that there is strong potential for the expansion of the local agricultural industry if further water for irrigation can be accessed, with investigations into water resource options underway.

Therefore, a likely future scenario is an increase in pest transmission risk (from north or south) due to an expansion of mixed horticultural cropping in Lakeland, larger influxes of transient farm workers, and greater numbers of tourists passing through the town on the way to or from Weipa or the Northern Peninsula Area (NPA) and Torres Strait.

Other horticultural production elsewhere on Cape York Peninsula and in the Torres Strait is small scale hobby farm, community garden, or backyard garden production with minimal pest control measures practiced - particularly pesticide based control. The preference towards organic methods of growing was noted several times during meetings with locals over the course of the trip.

According to senior biosecurity staff at Cook Shire Council, the Cooktown area has many small hobbyist growers, mainly organic, and they sell each Saturday at the market. The method of growing is predominantly organic. Feedback from several backyard gardeners in Weipa, and consultation with the Mayor of the Northern Peninsula Area Regional Council (NPARC) also confirmed that horticultural growing practices in much of the Cape was organic, with control methods involving milk, detergent mixes, or spraying of chili or garlic mixtures.

Governments and authorities

Local government areas cover Aurukun, Cook Shire, Hope Vale, Kowanyama, Lockhart River, Mapoon, Napranum, Northern Peninsula Area, Pormpuraaw, Wujal Wujal and Weipa Town Area. The local governments and authorities of Cape York Peninsula and Torres Strait identified during this trip are listed below and shown in Figure 3.

Cook Shire Regional Council

Aurukun Aboriginal Shire Council
Hope Vale Aboriginal Shire Council
Kowanyama Aboriginal Shire Council
Lockhart River Aboriginal Shire Council
Mapoon Aboriginal Shire Council
Napranum Aboriginal Shire Council
Pormpuraaw Aboriginal Shire Council
Wujal Wujal Aboriginal Shire Council

Northern Peninsula Area Regional Council
Torres Strait Island Regional Council
Torres Shire Council
Weipa Town Authority
Torres Strait Regional Authority
Torres Cape Indigenous Council Alliance

While this list covers the majority of authorities in the region it must be noted here that there are multiple and overlapping Aboriginal entities for the traditional ownership and management of lands and waters, such as the Cape York Land Council. Many parts of Cape York Peninsula and the Torres Strait are allocated Native Title, which can include pastoral leases, statutory Aboriginal freeholds and trustee arrangements (Memmott and Blackwood, 2008).

Liaising with governing bodies of native titles

The governing bodies of native titles should be considered, contact made, and permissions sought in the case of any biosecurity activities launched on the part of the Australian horticulture industry.

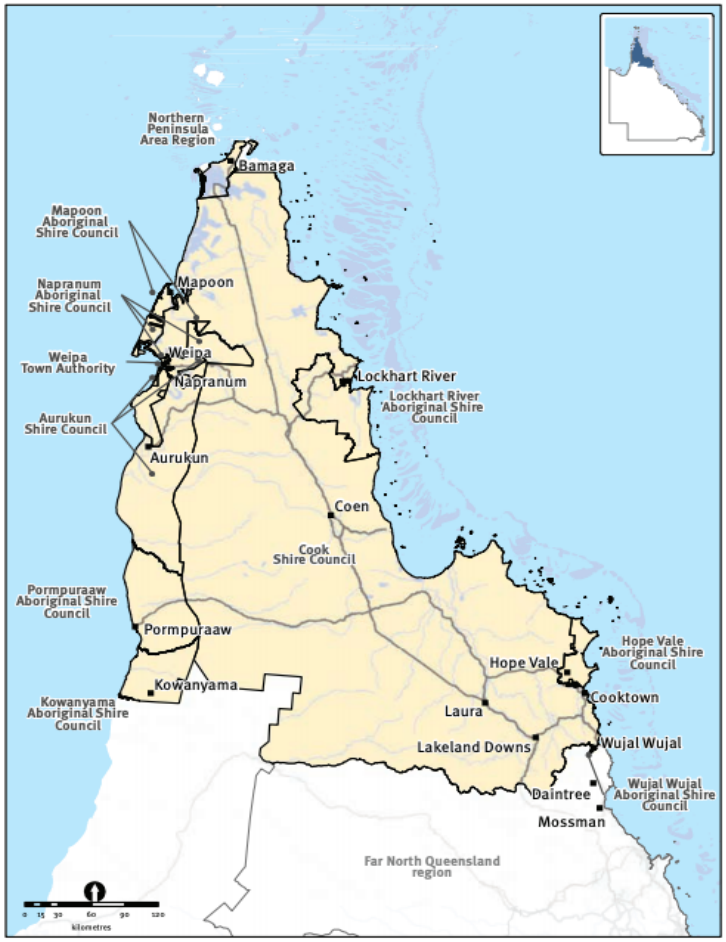

Figure 3. Local governments and authorities in Cape York Peninsula (Excludes Torres Strait authorities) (Source: Cape York Regional Plan, 2014).

Biosecurity legislation

Under the *Plant Protection Act 1989* and *Plant Protection Regulation 2001*, the area of Cape York North of Coen was gazetted as the Far Northern Pest Quarantine Area and the Cape York Peninsula Targeted Pest Quarantine Area. These legislative boundaries were repealed in 2016 and were replaced by new legislation under the *Biosecurity Act 2014* and *Biosecurity Regulation 2016*.

Under the Queensland *Biosecurity Act 2014* the region is now split into Far North Biosecurity Zone 1 (FNBZ 1), which begins at latitude 11 degrees 49 minutes south near Heathlands and the Jardine ferry crossing, and Far North Biosecurity Zone 2 (FNBZ 2), which begins at latitude 13 degrees 45 minutes south, which is north of Coen at the Cape York Peninsula Biosecurity Centre. FNBZ 1 spans the five townships of the Northern Peninsula Area as well as the Torres Strait.

The Torres Strait is further sectioned into the Torres Strait Protected Zone, which encompasses the region north of Mawai Island to Papua New Guinea, and the Torres Strait Permanent

Biosecurity Monitoring Zone, which encompasses islands between Cape York Peninsula and Mawai Island. These additional zones are legislated under the federal *Biosecurity Act 2015.* A treaty allows movement of people and traditional vessels between 13 Papua New Guinea townships and islands within the Torres Strait Protected Zone without the need to undergo entry requirements, however biosecurity compliance checks of vessels and goods are undertaken.

According to the Queensland Biosecurity Regulation 2016 plant material cannot move out of FNBZ 1 or south out of FNBZ 2 without a permit. Further, federal legislation specifies that plant material, soil and other risk materials (such as animals, dairy products, fresh vegetables, and untreated hides) cannot move from the Torres Strait Protected Zone to the Torres Strait Permanent Biosecurity Monitoring Zone, or from either of these zones into mainland Australia without a permit. There are currently no specific legislative instruments in place to restrict movement of plant material north into Cape York Peninsula from mainland Australia.

By necessity, the regulations that dictate movement of biosecurity risk materials between those zones are fairly complex. Even with the aid of handouts and flyers developed by the Australian Department of Agriculture and Water Resources and the Queensland Department of Agriculture and Fisheries, which can be picked up biosecurity offices and tourist hubs throughout the Cape and the Torres Strait, it is easy to understand why these regulations may become confusing for tourists.

Plant pest threats

Some high-profile horticultural Emergency Plant Pests that have been identified as a risk of spreading south through the Torres Strait and NPA include the Asian honey bee, banana skipper butterfly, exotic fruit flies, mango pulp weevil, red banded mango caterpillar, sugarcane borers, coffee mealy bug, and vegetable leafminer. A variety of exotic weeds, plant diseases and animal diseases are also described in regional awareness materials (see '*biosecurity education and awareness*' section for more information).

The vegetable leafminer had been surveyed for extensively at the time of writing, by the Queensland Department of Agriculture and Fisheries, the Northern Australia Quarantine Strategy, and more recently by the MT16004 project team. Based on surveillance results throughout the Cape and Torres Strait, the leafminer remains restricted to Seisia on the mainland, although a new detection of VLM was made at the Seisia Tourist Park during this trip, and a suspect detection was made on Zuna Island.

Additional *Liriomyza* sp. threats from the North

There are now two more exotic leafminers that have been detected within close proximity of the Torres Strait. These are the pea leafminer and serpentine leafminer.

Biosecurity authorities

The Department of Agriculture and Fisheries (Queensland State Government) and the Department of Agriculture and Water Resources (Federal Government) have a strong biosecurity footprint in the region, as regulators, educators, and surveyors of exotic pests. Inspection of risk materials moving southward through the Cape is carried out at the Cape York Peninsula Biosecurity Centre (formerly the Coen Information and Inspection Centre), which is managed by the Queensland State Government.

The Northern Australia Quarantine Strategy (NAQS) is a biosecurity program managed by the Federal Government. It was established in 1989 and is responsible for surveillance of exotic pests across northern Australia. It also manages biosecurity arrangements for traditional visitors from Papua New Guinea to the Torres Strait islands, and southward movement of people and products between the special Torres Strait biosecurity zones. It also plays a strong role in raising public awareness (see the 'Regional extension initiatives' section for more information).

A biosecurity working group comprised of representatives from DAF, the Australian Department of Agriculture and Water Resources (DAWR), Queensland Health, Australian Department of Environment and Energy, Torres Shire Council, Northern Peninsula Area Regional Council, Torres Strait Regional Authority, and Torres Strait Island Regional Council, has recently developed the 'Torres Strait and Northern Peninsula Area Regional Biosecurity Strategy'. The Strategy provides a framework and an ethos for how all regional stakeholders, including three levels of government, traditional owners, local residents and visitors to the region can better manage biosecurity threats.

Following development of the strategy, the Queensland State Government announced additional funding for a Far Northern Biosecurity Initiative of $1.7 million over three years which will help it deliver on its commitment to the strategy and bolster biosecurity capacity in the region. The intention of the additional funds is to support a range of new biosecurity measures in the region, including indigenous traineeships, extended operating hours for the Cape York Peninsula Biosecurity Centre, development of new awareness materials, and new engagement initiatives with local communities.

Regional biosecurity strategy

Developed by the Torres Shire Council, NPARC, TSRA and TSIRC, and the Queensland and Federal governments, this strategy was formally endorsed on 25 September 2018.

It was developed under the auspices of the 'Northern Australian Agricultural Competitiveness White Paper' in recognition of the "*unique challenges and opportunities in the management of biosecurity risks in Torres Strait and the Northern Peninsula Area of Queensland*" (TS & NPA Strategy, 2018).

Vision of the strategy

"We will support sustainable communities, protect the unique and pristine environments within our region, and play our part in preventing the movement of damaging pests and diseases, through practical, integrated and culturally appropriate biosecurity risk management."

As detailed by the strategy, its vision will be achieved by focussing on six priority areas:

1. Collaborative partnerships (encouraging community participation, regional coordination of biosecurity management, and use of local knowledge)
2. Understanding threats (pathway analyses, early reporting, data capture, pest assessments)
3. Making biosecurity more meaningful to communities (who need to see benefits from biosecurity and be engaged in addressing local biosecurity problems)
4. Communication and awareness (updating biosecurity materials in the region, use of biosecurity ambassadors and other communication channels)
5. Improved response (local partnerships, and tailored response plans for the region)
6. Improved capability and capacity (training, contingency planning, arrangements with local groups, such as the rangers)

Therefore, any collaborative biosecurity activities undertaken by Australian horticultural industries should keep this regional strategy, and its priority areas, in mind.

Regional extension initiatives

Major biosecurity awareness work in the Cape and Torres Strait is carried out by the Queensland Department of Agriculture and Fisheries, notably through the Cape York Peninsula Biosecurity Centre (described in the 'Biosecurity education and awareness' section of this report) and the Indigenous Land and Sea Ranger Program, and the Federal Department of Agriculture and Water Resources through the NAQS community engagement program 'Top Watch', which was established in 1992.

The Federal Government undertook an internal review of NAQS awareness activities in 2010, during which it developed the program's first communication strategy. Top Watch activities are directed at residents in the Torres Strait special biosecurity zones and the program encourages these stakeholders to keep a 'top watch' and report suspect pests. A key feature of this awareness program is the employment of local ranger staff to promote the Top Watch messages. On an annual basis funding of NAQS outreach is small compared with funding for surveillance, and awareness activities are often integrated into other NAQS activities.

According to a 2014 Federal Government brochure that featured NAQS initiatives and employees: "*It provides a vehicle for establishing strong working relationships with local communities, facilitating surveillance activity on privately owned land and improving*

compliance with legislation on the movement of prohibited items through the Torres Strait risk pathway."

Those engaged through NAQS Top Watch outreach activities have been predominantly locals rather than tourists (although NAQS does supply information materials to travellers, particularly during community events).

Recent outreach has also been conducted by Costa the Garden Gnome and Dirt Girl. They were enlisted Biosecurity Champions for Cape York Peninsula and the Torres Strait by the Department of Agriculture and Water Resources in 2017 with the intent of raising biosecurity awareness among travellers. Costa and Dirt Girl took part in developing a biosecurity awareness video 'Biosecurity in the Torres Strait is Everyone's Business'. The video has received 474 views on YouTube since its publication on 9 April 2018.

Development groups and initiatives

Community and natural resource development groups that actively participate in, or run activities that would align with, or support, further biosecurity awareness include:

- The Cape York Natural Resource Management group
- The Lakeland Progress Association
- The Junior Ranger Program (run through the Indigenous Land and Sea Ranger Program)
- The TSRA 'Healthy Communities' and 'Environmental' programs
- Landcare Australia
- My Pathways
- The North Australian Indigenous Land and Sea Management Alliance

Several initiatives that are currently run by these groups are expanded on below.

Mekem Garden Sustainable Horticulture Project

The TSRA Environmental Program, with support from its Healthy Communities program, has a component that aims to promote market garden activities through the 'Mekem Garden Sustainable Horticulture Project'. This project delivers food production training throughout the Torres Strait and encourages communities to access TSRA grant funding to aid them in developing and maintaining their own community gardens. This initiative is also coordinated in conjunction with the Regional Landcare Facilitator role and receives funding from the Australian Government's 'Caring for our Country' Program.

This trip included a meeting with George Saveka, the Regional Landcare Facilitator with the TSRA Land and Sea Management Unit, and main officer working on the Sustainable Horticulture project. The project aims to achieve the following:

- Facilitate workshops on outer islands to provide practical and technical demonstrations on food gardening.
- Provide guidance and assistance in the establishment of community gardens in two communities.

- Provide guidance and assistance in the development and maintenance of plant nurseries.
- Increase awareness of sustainable horticulture throughout the region through a monthly newspaper garden column and island visits.

Mr Saveka travels regularly between the inhabited islands of the outer Torres Strait, training communities in growing practices. It was noted by Mr Saveka that Torres Strait island soils are quite diverse and providing advice for growing on these diverse soils can be difficult.

According to the TSRIC the islands can be divided into four main groups: an eastern group of high volcanic islands, a central group of low sandy islands, a western group of high islands composed of volcanic and granitic rocks, and a northern group of low islands composed of mangrove muds and peats. During the meeting with Mayor Newman of NPARC it was also pointed out that there are soil issues in the Cape. It is very acidic, porous and there have been reports of nematode issues. Combined with the climate this makes it difficult to grow vegetables.

A land of complex growing conditions

The soil profile of the Cape and Torres Strait is complex. The western region of the cape, which is a large river plain, is composed of laterite, a mineralised soil of low fertility, typically overlain by hard ferrous deposits. Beneath them the pale coloured, soft material often contains bauxite. While visiting Seisia it was mentioned that the soil was quite acidic.

Importantly, this project provides better access to fresh and nutritious fruits and vegetables. As noted by TSRA Chairperson, Mr Toshie Kris in one information flyer about the sustainable horticulture project:

> *"Our Elders taught us how to grow and use different plant species, and now it's our children's turn. Except today they have the added advantage of combining traditional knowledge with contemporary horticultural practices."*

It was also noted by Mr Saveka that there is a need to educate communities about the nutritional content of fresh produce, particularly vegetables, and the health benefits associated with growing this produce. The cost of fresh produce is higher than average (Appendix 1), and it is possible that more NPA and Torres Strait communities will endeavour to start their own market and community gardens. Therefore, there is potential for additional surveillance and best practice pest management should a partnership be formed with the TSRA sustainable horticulture project.

Fresh produce can be costly in the NPA and Torres Strait

The cost of fresh produce was recorded at one Cape York retail outlet during the trip, and it was observed that the cost of many vegetables was above average, with the costlier items being broccoli at $5.99 a head and snow peas at $33.00/kg.

Thoughtful travelling Cape York campaign

The Cape York Natural Resource Management group coordinates the 'Thoughtful Travelling Cape York' campaign, which seeks to encourage visitors to leave Cape York campsites better than they find it. Their Cape York Keep it Clean guide contains information on camping best practices, location of rubbish bins on the Cape, managing fire risks, cultural considerations, and notably, reducing the risk of transferring weed seeds around and out of the Cape. Multiple collaborating organisations are involved in this initiative and there may be opportunity to supply further information on biosecurity best practices and on key horticultural pest threats.

Gateway to the Cape information centre

The Cook Shire Council has developed plans for a new information centre to be built at Lakeland, adjacent the Mulligan Highway and Peninsula Developmental Road intersection at the current location of the wash down station (which is now decommissioned with plans for full removal). This 'Gateway to the Cape' Tourist Information Centre is intended to become a regular stopping point for travellers and will provide a useful opportunity for educating visitors before they enter the region.

Therefore, this future education centre provides an opportunity for awareness to be raised about key horticultural pests as most tourists on the Cape access and leave the region by road. Further information about information centre plans can be found in the Lakeland Local Area Plan Background Report (2017) or sourced directly from the Lakeland Progress Association.

Lakeland washdown station a point of interest for travellers

The Lakeland washdown station was noticed by many tourists on the drive north into the Cape, with some even driving onto it and attempting to get the wash down station working (see section 3). The future of the wash down station is undetermined.

Outreach to schools

Several schools were visited during this trip. They were: Western Cape Primary School, Lakeland Primary School, St Joseph's Parish School (Weipa), Northern Peninsula Area State College, and Tagai State College (tertiary campus on Thursday Island and primary campus on Horn Island).

Primary schools were supplied with a vegetable leafminer colouring activity, and instructions for conducting a 'mock surveillance' competition. Secondary school biology students at Tagai State College and agriculture students at Northern Peninsula Area State College were shown parasitoid wasps under the microscope and photos of vegetable leafminer damage.

The feedback from school staff was positive and the two secondary schools expressed an interest in future visits from the project researchers. Speaking about career paths into research is highly beneficial for local students as the region does not have a large number of scientists. In addition, the students are actively engaged in field work at the school farm in the case of Northern Peninsula Area State College. This means that students can notify local rangers if vegetable leafminer damage is observed at the farm as long as they are aware of what indicators to look out for (the Northern Peninsula Area State College is in Bamaga, an area in which vegetable leafminer has not yet been detected).

Biosecurity education and awareness

Biosecurity radio alerts

As you travel throughout Cape York Peninsula, you will see a number of signs asking you to help protect Australia by tuning to FM 88 on your car radio. This radio station is dedicated to biosecurity updates for travellers and is accessible near urban areas on the Cape. However, during this trip, which was undertaken in the first week of the tourist season, radio updates could not be accessed. This may have been due to a lack of alerts at that point in time or due to the radio frequency and area signal.

The biosecurity alerts are broadcast on low powered FM radio transmitters that reach within a limited distance around the sites where they are installed. The 'transmitters are run by the Department of Agriculture and Water Resources. According to the Australian Commonwealth publication 'Quarantine Protects Cape York' this broadcast should be accessible at the Hann River, the Cape York Peninsula Biosecurity Centre, Archer River, Moreton Telegraph Station, the Jardine ferry crossing and at Seisia. It would be useful to know how many travellers try to access the updates on this radio station, and how this station can be further used for further awareness.

Biosecurity signage

Signage for the NAQS public awareness campaign, 'Quarantine Top Watch', is prevalent. This signage encourages the public to report exotic pest species, and to comply with biosecurity regulations. Additional signage observed included an aged sign for controlling banana

movement near Bamaga, and an information sign describing the red banded mango caterpillar at Pajinka (the tip of Cape York). Examples of signs are shown in Figure 4.

Surveying of visitors to the Cape during this trip revealed that most understood that the Cape has special biosecurity status based on signs they had seen while driving north on the Peninsula Developmental Road. However, based on discussions with tourists during the survey component of this study, this signage could have greater impact if placed earlier, perhaps on the Mulligan Highway and in the southern section of the Peninsula Developmental Road.

On the road to the Jardine Ferry crossing there was one biosecurity sign, approximately 1 km south of the crossing, which showed the old quarantine zone, denoting the zone as one single zone from Coen north to the tip. Outdated signs are soon to be replaced with updated versions as a result of new funding, as described in 'Biosecurity authorities' section of this report.

Figure 4. Examples of roadside signs observed during this trip.

Biosecurity Inspection Centre

The Cape York Biosecurity Centre (formerly the Coen Information and Inspection Centre) was visited during this trip where we met with Scott Templeton, Biosecurity Compliance Officer, who briefed us on the role of the inspection centre and the region of Cape York Peninsula that is under QDAF jurisdiction for pest surveillance (FMBZ 1 and FNBZ 2).

The Inspection Centre was once based at Laura before moving to Coen. The car counter positioned at Musgrave during this period (the 1990's) counted 7000 cars travelling north. In 2017 the Cape York Biosecurity Centre car counter counted 27,000 cars travelling North. The centre managed to inspect 18,000 of those cars with two full time staff members and two casual employees (pers comms, Cape York Biosecurity Centre staff).

Tourists frequently stop at the Cape York Peninsula Biosecurity Centre, where they can pick up a variety of information materials and receive a briefing from staff about what the centre does, and what the major biosecurity risks are in the region (Figure 5). Feedback in the visitor guide highlighted the appreciation of visitors after receiving face to face biosecurity information.

Some feedback included:

- *'Love the info!!!'*
- *'Great video!!!'*
- *'Fantastic info! Thank you!'*
- *'Great info & very interesting!'*

During this visit a tourism company (Outback Spirit) arrived and requested a briefing at the centre. This tourism company was training its newest group of tourism operators and on this particular visit they had brought approximately 15 tourist-guide trainees for education from the centre. This represented a perfect opportunity to brief the trainees about VLM, as well as supply the company with awareness flyers. Under the recent biosecurity funding boost the Cape York Biosecurity Centre will soon be updated with new resources. This funding boost will also support extending operational hours of the centre (information packs are currently placed at the inspection point on the weekend when the centre is closed).

Figure 5. Awareness material and biosecurity displays at the Cape York Peninsula Biosecurity Centre, and the inspection point (bottom left).

Flyers and brochures

There were several information flyers and brochures available for travellers along the route (Figure 6). Apart from the selection of information guides made available at the Cape York Peninsula Inspection Centre, the 'Help Manage Biosecurity Risks in Australia' (Top Watch) brochure was available to the public at the Northern Australia Quarantine Strategy office on Thursday Island, as well as a flyer instructing visitors about what cannot be moved out of the Torres Strait without a permit.

The 'Travelling in Cape York and Torres Strait' guide, obtained at Coen, gives tourists an overview of biosecurity zoning and regulations in the region. There is also useful information in this guide in relation to pests (particularly weeds) that may be carried between regions if tourists are not careful. It is split into two major sections - considerations for those travelling north, and considerations for those travelling south. An important aspect to consider is when travellers are most likely to pick up this guide, and therefore, locations (and times during the year) along the Mulligan Hwy and Peninsula Developmental Road where they may be made available. For example, one page in this guide provides information on imikania vine, which has been found in Speewah near Mareeba. Therefore, having that information readily available for travellers before they travel from, or pass through, the Mareeba region would aid in targeted risk reduction.

The Peddles Ferry also carries biosecurity material that raises awareness about Torres Strait biosecurity zones. Laminated biosecurity handouts are supplied on each seat, and the ferry plays a video during its southerly transit that educates passengers about the Torres Strait Permanent Biosecurity Monitoring Zone legislation.

Other potential locations for awareness material include a popular tourist destination, Fruit Bat Falls, which is located slightly south of the Jardine Ferry Crossing, as well as the Jardine Ferry Crossing itself (Figure 7).

Figure 6. Information material picked up at the NAQS office on Thursday Island (top three images), and a laminated flyer supplied on the Peddles Ferry (bottom).

Figure 7. Tourists stop for a rare swim on the Cape at Fruit Bat Falls (left), and the view on the approach towards the Jardine Ferry crossing – the beginning of FNBZ1 (right).

Further regional insights

This trip involved meetings with several authorities in the region, and insights from these meetings have helped to contextualise the findings in this report. One meeting was held with Mr Eddie Newman, Mayor of the NPARC. Mayor Newman was able to highlight the risks faced by the NPA from plant pests and weeds moving from south to north, two examples of which were the cane toad (which has recently extended its range to Thursday Island) and gamba grass, which had been brought to QLD as a fodder crop several decades previously. Key insights about the region gained during this meeting are included below.

Pest transmission and pest management

- Weeds and seeds coming from the south is perceived to be a big issue.
- There are many plant pests spreading from the north – it is a constant issue.
- Chemical control of insects in the NPA would mostly be for mosquito and growing of produce is largely done organically.

Jardine Ferry Crossing

- There are no biosecurity check points for people moving north into the Cape. The Jardine Ferry crossing is a potential location for such a checkpoint.
- The Jardine Ferry crossing hours are likely to be extended from 6am-7pm although this is still to be confirmed. This would allow locals working south or north of the ferry to travel back home.
- The ferry crossing should ideally have a biosecurity checkpoint on both sides for travellers.
- There has been discussion about bringing the wash bay north from Lakeland to the Jardine Ferry Crossing.
- The Mayer suggested a practical investment – dongas could be built at the Jardine Ferry crossing, which would enable the Ferryman to work extended hours.
- Investment in biosecurity training for the ferry workers was also suggested, which would enable the ferry personnel to educate travellers.
- Biosecurity bins and new signage is needed, especially at the Jardine crossing, but potentially at other key locations on the drive north.

Tourists

- Tourist traffic has increased over the years but is also 'bigger' (e.g. there are caravans, quad bikes and buses travelling on the Peninsula Developmental Road now).
- Plans to completely seal the Peninsula Developmental road in the next decade was also noted. This will mean more tourist traffic moving north and south down the NPA, and between the Torres Strait and the mainland. This pest transmission pathway will come under increasing pressure.

Biosecurity inspections

- Not enough biosecurity inspections between the mainland and the Torres Strait islands are being carried out – the entry of the cane toad to Thursday Island highlights this.

- The Cape York Peninsula Biosecurity Centre is not active 24/7 and locals mainly travel at night and on weekends to beat the traffic, which means they would miss any inspection at Coen as they drove north.
- Dinghies routinely travel between islands and to the mainland and would avoid any biosecurity checks.*

*On advice from biosecurity authorities – *DAWR do intercept and inspect dinghies which may have crossed a quarantine zone – not all of these vessels can be checked by local officers who perform patrols at boat ramps. Quarantine signage is located at all boat ramps in the NPA.*

Travellers and biosecurity risks

Tourism on Cape York and in the Torres Strait is heavily seasonal, with touring being restricted to May and November due to monsoonal weather and road closures. A Cape York Tourism Action Plan was developed by Cape York Sustainable Futures (2015-2016) to guide infrastructure and development activities from 2016 to 2021. The action plan makes note of the expected changes to Cape York tourist type in the near future. It is predicted that, apart from the 4WD and fishing enthusiasts, visitation will increase to include shorter term travellers with caravans or motorhomes. It also predicts that visits from tourists flying directly in and directly out will increase.

Over recent years sealing of the Peninsula Developmental Road has begun. It is expected that further sealing of the road will lead to a change in the type of tourist visiting the Cape, as well as supporting an extension of the tourist season due to a reduced number of wet season road closures. At the time the plan had been developed the bulk of visitors were described to be mature aged, traveling in 4WDs and preferring to camp.

Infrastructure priorities included in the plan are:

- Continued improvements to the Peninsula Developmental Road;
- Communication and increased mobile phone coverage;
- Improved facilities at airports; and
- Dredging of the Endeavour River to enable large passenger ships to land.

The Cape York Region Package, which was announced in 2014 by the Queensland Government, allocated $260.5 million to improving infrastructure in the Cape. The funds, contributed between the federal government and the Queensland Government, have supported further sealing of the Peninsula Developmental Road between Laura and Weipa.

Tourism in the Cape York Peninsula Area has one major activity hub in the lower Cape based around Cooktown. The other major tourism hub is Pajinka (the Tip of Cape York) and Weipa?

According to the Cape York Tourism Action Plan the target tourist market is self-drive domestic and international visitors, who enjoy camping or modest accommodation (for example, 4WD adventure seekers, or those interested in fishing). This plan also highlights a secondary target market of those visitors who are interested in a short holiday and transit via flying, cruising, or driving. Periphery target markets include people seeking authentic indigenous experiences,

those seeking an Australian outback area adventure, birdwatchers, and ecotourists. According to this plan there is also the intent to build a bridge over the Jardine river.

Short-term visitors predicted to increase

A number of regional infrastructure and tourism planning initiatives in recent years have led to predictions that the number of short-term visitors will increase as the Cape becomes more accessible.

Tourist volume

It is difficult to determine exact annual Cape and Torres Strait tourist numbers. However, it is clear that the number is increasing with the rise of ecotourism and increased accessibility. There is a need to better understand tourist numbers, their purpose in visiting the Cape and Torres Strait, the method of travel, and origins, in order to better determine the risk of travellers as a pathway for exotic plant pests.

Sourcing data from the following companies may aid this risk assessment:

- Coen Centre (car counter).
- Seisia Caravan Park.
- Weipa Caravan Park.
- Peddles Ferry.
- Umagico Caravan Park.
- Loyalty Beach Camp Park.

Visitors through Bramwell Station Tourist Park

Bramwell Station is a major tourist stop during peak season. In the month of July it holds the Bramwell Music Muster that attracts thousands of tourists, as well as the Bramwell Cup Bush Carnival. On the night we arrived Bramwell Station had 12 tourists staying in the campsite. According to the station manager, the following week the number was expected to swell to 80 people each night. There are plans to develop an 'eco-tourism' route near the station, which would encourage visitors to stay longer at the station. In regard to the type of tourist that is visiting the station, the manager mentioned that caravans were very uncommon five years ago. During our stay we noted two of the six campsites pitched were caravans, the owners of which noted that they were pleasantly surprised by how easy it had been to transport the caravans up and down the Cape.

Visitor biosecurity awareness

Tourists represent a growing risk for transfer of plant materials and plant pests both north into the Cape and Torres Strait, and south into production regions and communities. With this risk pathway in mind, part of this engagement tour focussed on interviewing locals about their observations concerning growing numbers of tourists, verifying the type of tourist visiting the region, and interviewing tourists themselves to gauge their level of biosecurity awareness.

Tourist Survey

This trip was conducted in the first week of the tourist season, when visitors had started to arrive at the Cape and make their way north, mainly to camping grounds or fishing spots. Since awareness material was being supplied to each tourist park encountered during the trip it was decided that a biosecurity awareness survey would be undertaken with short term visitors at these campsites. Before surveying tourists, permission was received from the manager of each tourist park. Surveyed tourist parks were: Weipa Tourist Park, Bramwell Station, Seisia Holiday Park, and Loyalty Beach Campground.

The aims of this survey were to gauge the level of biosecurity awareness of short-term visitors to Cape York Peninsula, find out from where they source biosecurity information before travelling, and to determine the origins of these tourists. Interactions with tourists during each survey served as an opportunity to educate newly arrived tourists about biosecurity regulations on the Cape and the Torres Strait, as well as the risk posed by VLM. Visual aids (laminated maps and pictures of VLM damage) were used to supplement the briefing and those surveyed were supplied with the project flyer and vegetable leafminer awareness flyer.

After supplying an information sheet about the survey and gaining agreement from the surveyee, background information was collected on the following topics: Age range, occupation, origin, purpose of visit, method of travel, towage, and accommodation type. After collecting this information the following questions were asked:

1. In your view, how important are biosecurity policies & regulations for Australian communities and industries (1 = low, 5 = high)
2. Can you name a past or present exotic pest outbreak in Australia?
3. Have you ever heard of the Vegetable leafminer? (If yes, where did you hear about it?) (Yes/No/Unsure)

At this point the surveyee was supplied with a briefing on vegetable leafminer, the risk posed by the pest, where it was currently located on the Cape, and information about the project. They were also advised on how leafminer damage manifests and how they should report suspect detections. The surveyee was then asked the following questions:

1. Have you visited Cape York Peninsula / Torres Strait previously? (Yes/No/Unsure)
2. If yes, during your previous visit did you transfer plant products out of the Cape or Torres Strait? (Yes/No/Unsure)
3. Are you aware that Cape York and the Torres Strait are designated biosecurity zones? (Yes/No/Unsure)

At this point the surveyee was supplied with a briefing on the new biosecurity zoning in the Cape. The surveyee was then asked the final question:

1. Has your new knowledge raised your awareness about the importance of biosecurity on CYP and in the TS? (Yes/No/Unsure)

The surveyee was then invited to make further comment on the subject on the survey, biosecurity, or the vegetable leafminer and this discussion was documented. The total number of tourists surveyed was 62.

Demographics

The most common age range of those surveyed was between 50-60 at 34%, followed by 60-70 at 27%. Other age brackets were surveyed at the following frequencies: 20-30 at 11%, 30-40 at 16%, and 40-50 at 11%. Of those surveyed 27% were female and 73% male. Occupations were varied, however the most commonly supplied single occupation was 'retiree' at 23%. Other common occupations included trades, health industry work, and truck drivers (Table 3).

Table 3. Summary of occupations supplied by surveyees (n = 62)

Occupations	**% of surveyed**
Retiree	23%
Trades (Carpenter, fitter & turner, builder, tree lopper, arborist, electrician, rigger, maintenance supervisor)	23%
Health (Carer, nurse, nursing assistant, physio, disability support worker, mental health worker, health manager)	15%
Community services (Police, firefighter)	6%
Truck driver	6%
Producer (Blueberry grower, wheat grower, sheep farmer)	5%
Education	3%
Other (Vet, financial planner, financial manager, picker and packer, administration, student, court registrar, plant operator, security guard, hospitality)	19%

Response to survey questions

Purpose of visit, method of travel and origin

The Cape York Tourism Action Plan states that Around 90% of visitors are domestic with the balance being international travellers. This complies with the results from this survey whereby of those surveyed, the majority (95%) had driven up the Cape through Coen on the Peninsula Developmental Road (rather than having flown into a more northerly town and driven south). Five percent of the surveyed flew into Bamaga and rented a car, however, at the time of the survey these respondents had no intention of driving south.

The origin of those surveyed was captured in 42 of the 62 interviews. Based on the data recorded, 90% of surveyees had travelled up from the east coast of Australia, with three of those surveyed having flown directly into Bamaga and the remainder having driven north from their points of origin. The summary of tourist origins are included in Table 4.

All surveyees supplied 'holiday' as the reason for the visit, with 32% specifically stating 'fishing holiday'.

While 55% of those surveyed did not have towage, of those that did have towage, boats were most common at 43%, followed by campervans at 29%, caravans at 14%, and trailers at 14%. Of the surveyed that were towing boats, trailers or had no towage, 74% were staying in tents, and 26% had booked cabins.

Surveys were conducted on an individual by individual basis, however since tourists commonly travelled in groups (on average 2-6 people per group) the actual number of boats, caravans, and trailers is lower than these percentages suggest. For instance, due to sharing of boats within groups, the total number of boats was 12, and the total number of campervans was eight. One surveyee admitted he was nervous about bringing the caravan but had been surprised by how easy it had been to tow it on the unsealed roads to Seisia. At least two of the surveyees noted they would have brought a caravan but were unsure they could be towed on the roads in the Cape.

Of the tourists surveyed, 45% reported to have visited Cape York Peninsula or the Torres Strait previously. Of those return visitors, 61% had visited 1-2 times previously, 7% had visited 3-5 times previously, and 32% had visited more than 5 times previously.

Table 4. Origins of surveyees (n = 42)

State or territory (regions)	**% of surveyed**
Queensland (rural QLD, Cairns, Burdekin, Bowen, Gold Coast, and unspecified)	50%
New South Wales (Coffs Harbour, Sydney, Wollongong, Byron Bay, Brawley Point)	21%
Victoria (Shepparton, Mario, Melbourne)	19%
Western Australia	5%
Northern Territory	5%

Importance of biosecurity

In response to the following question '*In your view, how important are biosecurity policies & regulations for Australian communities and industries (1=low, 5=high)'* 81% of those surveyed answered with a 5 (high), 13% answered with a 4 (moderately high), and 6% answered with a 3 (moderately). In response to this question one surveyee felt that "they were not educated enough to give a confident answer". Further comments from surveyees in response to this question were: *"5 x 2!"*

Awareness of biosecurity pests

In response to the following question '*Can you name a past or present exotic pest outbreak in Australia?'* the following pests were supplied: Cane toad, citrus canker, fireweed, locusts, warehouse beetle, carp, pythenium, foot-in-mouth, prawn whitespot, "weed in Kakadu infesting waterways", "flying fish disease in New Zealand", fire ants, fruit fly, sugarcane rust, prickly pear, rabbit, lantana, blackberries, Paterson's curse, foxes, cats, wild dogs, panama disease, papaya fruit fly, spiralling whitefly, "SE QLD African fish (like a brim)", talarpia, miner bird, morning glory, bitterweed, crown of thorns, banana freckle, cucumber green mottle mosaic virus, red imported fire ant, red tulip, red banded mango caterpillar, wheat rust, bees, cane beetle, Hendra virus, mad cow disease, mother of millions, *Aedes agypti*, varroa mite, Indian miner, and pigs.

The most commonly mentioned exotic pest was the cane toad (mentioned 11 times). Some answers provided were very context dependent. For instance, a blueberry grower from Coffs

Harbour had supplied cucumber green mottle mosaic virus as an answer. This grower also produces cucumber and had attended an information event about the virus the previous year. In addition, one surveyee supplied red banded mango caterpillar and noted he had visited Punjinka the previous day and had read the biosecurity sign about the pest. Interestingly, many answers related to endemic pests, rather than exotic pests under eradication or containment. This question was useful in further assessing the level of knowledge these tourists had in relation to biosecurity risks, as well as placing these surveyees in a 'biosecurity' mindset before answering the remaining questions.

Knowledge of vegetable leafminer

In response to the question '*Have you ever heard of the vegetable leafminer? (If yes, where did you hear about it?) (Yes/No/Unsure)*' 15% of surveyees answered 'yes' and 85% answered 'no'. Of those who answered yes, sources of their knowledge were Landline (two surveyees), TAFE, TV, online, and from a previous employer (this surveyee had worked for the Queensland Department of Agriculture and Fisheries before retirement).

There was some confusion regarding vegetable leafminer. Most of those surveyed who replied 'yes' were unsure of the source of their knowledge. In addition, when surveyees who had responded 'yes' were questioned further about their knowledge it became apparent that in most cases they were confusing vegetable leafminer with an endemic leafminer species, most likely brassica leafminer. One surveyee also noted that they may be getting confused with citrus leafminer.

Knowledge of biosecurity zoning

In response to the question '*Are you aware that Cape York and the Torres Strait are designated biosecurity zones? (Yes/No/Unsure)*' 81% of surveyees responded with 'yes', 18% responded with 'no', and 2% (1 person) responded with 'unsure' (n = 62). When the source of this knowledge was queried, several tourists noted that they had seen the signs outside of Coen (with four surveyees reporting they had picked up information packs from the centre), they had been briefed by the biosecurity officer at the Cape York Peninsula Biosecurity Centre, or they had seen road signs in other locations along the Peninsula Development Road. Those that had picked up information packs from the Cape York Peninsula Biosecurity Centre mentioned reading the Travellers Guide to Interstate Quarantine supplied with the pack. Several surveyees also noted that they had noticed the truck washdown bay at Lakeland, and one had tried to drive onto it "*because I wanted a clean car*" but found that the bay had been decommissioned. Several surveyees noted that they had driven north through Coen on the weekend and questioned why the inspection centre was not open.

Only four respondents specifically mentioned that they had conducted pre-holiday research on the topic online and had taken note of biosecurity instructions in their hardcopy road maps. In some instances, those surveyed were aware that the Cape was a biosecurity zone (many used the term 'quarantine zone') but were surprised when informed that the Cape is split into biosecurity two zones. One surveyee responded that he "*thought it was just banana that couldn't be taken south*". In some instances where a surveyee was aware of the biosecurity zoning arrangements, there was confusion about the regulations, with one surveyee noting "*I wasn't sure if it applied to travelling both north and south*" and another noted that "*the*

biosecurity manual in the [information] pack was not clear about what could be brought in and taken out."

One major theme arose during discussion of the biosecurity zoning on the Cape – tourists were clearly taking notice of the biosecurity road signs during the drive north, with signs being mentioned by 23% (14) surveyees as a source of awareness.

Further comments from surveyees in regard to signage included: *"Better education is needed, and more signs"; "Why there are not more biosecurity signs on the Cape?"; "There should be more signage on the drive up"; "Pictures of what to look out for would be useful"; "We heard on the ferry to Thursday Island that the Torres Strait is a quarantine zone. I had also seen the signage at the ferry crossing"; "I noticed a quarantine sign in Somerset which was very old"; "I noticed a lot of signs about the red banded mango caterpillar, which was near the Seisia wharf.*"

This survey also sought to gauge how much plant material was transferred out of the Cape and Torres Strait by tourists. Of those surveyed who had visited the region previously (n = 28) 21% noted that they had transferred plant products out of the Cape or Torres Strait and 7% were unsure. Of those that had carried plant material out of the region previously on respondent mentioned that the plant material taken south was a coconut, while another noted they had taken plant material *"into the cape, not into Torres Strait".* Another who had replied 'no' qualified the answer with "*maybe burs on clothing*".

Knowledge change

In response to the following question '*Has your new knowledge raised your awareness about the importance of biosecurity on CYP and in the TS? (Yes/No/Unsure)'* 97% of respondents answered 'yes' and 3% answered 'no' (n = 62). Of those that answered 'no' they added that their biosecurity awareness was *"already high"* and they had picked up information packs from the Cape York Peninsula Biosecurity Centre during the drive north. Further comments from surveyees in response to this question were: "Absolutely, thanks for the information"; "It certainly has"; "Definitely"; "Definitely raised it"; "It was high anyway"; "Absolutely!"; "Already high"; "Already high and very mindful"; "Sure has".

Further comments from surveyees

Those surveyed were invited to make further comments following completion of the questioning. Those comments not covered in the previous sections are included below.

"This survey is the most I had ever heard about biosecurity".

"We were not aware Coen had an information centre and we'll stop in when driving south"

"We don't want that [VLM] going south".

It was noted by one of the surveyed that quarantine regulations "need to be strict"

"There was nowhere to dump plants or plant products at the Jardine Ferry Crossing"

"We had to park on the other side of the road from the centre to take an information pack, and there was no designated place to park. This made it confusing"

"Travellers could sign a document at the Jardine Ferry Crossing to ensure they understand the regulations"

Sources of biosecurity information

Several sources of information were mentioned by those surveyed, with signage, followed by the Cape York Peninsula Biosecurity Centre being the most commonly cited reason for having some knowledge of biosecurity regulations and risks in the region. One surveyee mentioned that they were aware that the Cape is a biosecurity zone because it was listed a road map he was using to navigate the region, but this map was outdated and did not show the two new biosecurity zones on the Cape.

This surveyee commented that he and his partner had gained a lot of information about the biosecurity status of the cape from WikiCamp Australia. This is a camping application that claims on its website to be "*the largest and most up-to-date database of campgrounds, caravan parks, backpacker hostels, day use area, points of interest, information centres and public dump points*". This surveyee made the suggestion that biosecurity authorities could place information and updates on that app.

When the search term 'biosecurity' is input on the WikiCamps chat forum only three chat threads appear. However, using 'quarantine' as the search term results in a plethora of threads. In many of these threads campers are requesting information about biosecurity requirements when crossing state borders and asking confirmation from other forum users about checkpoint locations (Figure 8).

Another pre-holiday source of information about biosecurity requirements was online 'grey nomad' forums, although none were specifically mentioned, although the main reason for checking these forums seemed to be for information on road status pre-arrival.

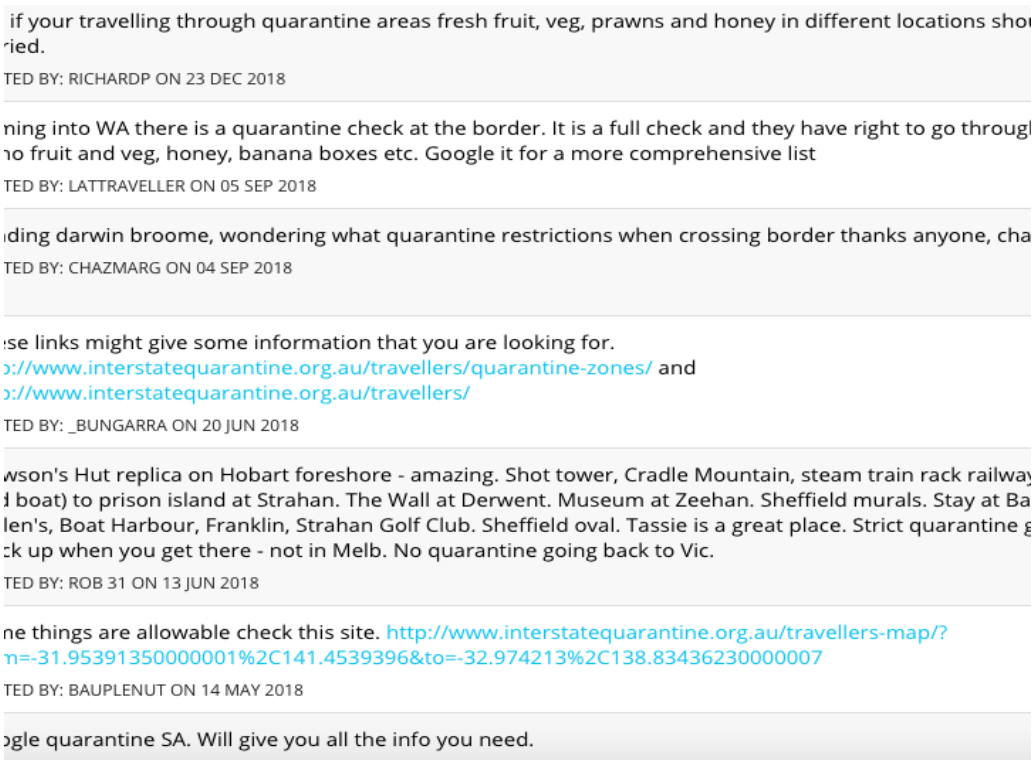

Figure 8. Excerpt from the WikiCamps Australia forum following input of the search term 'quarantine'.

Discussion

This was the first industry led and industry driven biosecurity scoping study to be carried out in the Cape York Peninsula and the Torres Strait. This initiative represents a concerted effort by the Vegetable industry and Nursery & Gardens Industry to develop networks in the region, learn about the operational components of the region, understand the biosecurity legislation that governs the region, and investigate the role that tourists may play as a risk pathway into southern growing regions.

One common question from tourists that were surveyed was in regard to how long it would take for VLM to spread south. At the Seisia Holiday Park there was a good example of the short time it could take an exotic pest to spread south when assisted by human movement.

Two surveyees travelling together were carrying two sweet basil plants (hosts for VLM) in their caravan, which had been brought up with them from south of Coen. They had placed the basil plants outdoors on the caravan step to get some sunlight. However, unbeknownst to these visitors their caravan was situated approximately 50m from a VLM infestation. They had intended to carry the basil plants south after leaving Seisia, however these caravaners were asked to leave the plants in Seisia and they quickly agreed.

The tourist survey highlighted that the region attracts a high amount of return visitors. This suggests that the region offers more than a new place to visit and adventure, and that short-term visitors to the region feel a bond to the place, which could support adoption of better biosecurity best practices. The fact that many tourists to the region may return should be kept in mind when developing biosecurity awareness and educational material, as well as when governments and other organisations decide where to present this information. However, it should also be noted that this survey was conducted in the first two weeks of peak season and it is possible that return visitors preferentially visit the Cape early in the season to avoid crowds both at the comp sites and on the fishing grounds.

It is clear that the numbers of tourists visiting the Cape and Torres Strait is increasing and will likely increase at a greater rate as infrastructure continues to improve. However, the tourist camping experience has also changed. One surveyee described a previous visit in 1988 when she had been "*camping rough*" as the cape was much different back then. During that trip she had survived on tinned food. However, good roads, car fridges, and proximity to goods means that tourists are now able to carry fresh produce fresh with them when moving up and down the Cape.

While many of those surveyed noted that they were aware of the Cape York Peninsula and the Torres Strait special biosecurity status, the source of their information was often from road signs noticed while driving through Coen or further north from Coen. A few travellers had also noticed the decommissioned wash bay at Lakeland. Few of those surveyed listed information sources accessed before the holiday. Therefore, according to the results of this survey many tourists travelling to the region by road would become aware of biosecurity regulations only once they had entered the Cape, which places far northern communities at risk from spread of southern pests.

While there are no regulations that restrict plant material from moving north, there are good examples of exotic pests moving north and disrupting the ecology of the region (e.g. gamba grass now contributes to bush fire risk on the Cape, and the cane toad is now found in abundance on Thursday Island). In consulting with the Mayor of NPARC during this trip it is clear that locals are concerned about what else may move north and impact on their way of life.

Based on advice from the Queensland Department of Agriculture and Fisheries, tourists are encouraged to ensure their equipment, vehicles and clothing are clean from plant material before entering Cape York and the Torres Strait (DAFF, 2018). However, prominent signage displayed on the Mulligan Hwy prior to Lakeland, or in the southern section of the Peninsula Development Road may contribute to further biosecurity precautions being taken by tourists.

Apart from the number of tourists entering the region each year, the type of traveller is also likely to change. One surveyee admitted he was nervous about bringing the caravan but had been surprised by how easy it had been to tow it on the unsealed roads to Seisia. Another surveyee noted he would have brought the caravan but was unsure it could be towed on the roads. Once tourists realise that the road is navigable with towage caravans and campervans will likely become commonplace.

As the Cape attracts more and more short-term visitors, recent funding government funding will support several important initiatives being undertaken, such as extension of operating hours at the Cape York Peninsula Biosecurity Centre, and updated signage. However, horticultural industry activities could further boost biosecurity in the region by leveraging existing initiatives.

As noted in this study, there are several existing biosecurity initiatives and plans for future initiatives with which Australian horticultural industries may partner. These include the Thoughtful Travelling campaign, information displayed at the Cape York Peninsula Biosecurity Centre, and the future information centre to be developed at Lakeland. In particular, the TSRA Sustainable Horticulture project may be approached to collaborate on pest management, pest identification, and soil management training in the Torres Strait, which would support the region in being an effective pest 'buffer' zone, support better nutrition in the region, and aid community-based pest surveillance. Councils in the NPA could be approached to partner on similar initiatives on the Cape.

There are also businesses in the region that have a stake in keeping it pristine and pest free. These include tour guide companies (such as Outback Spirit), holiday parks, and regional flight companies. Information about high priority horticultural pests and biosecurity best practices for tourists may be applied to these companies for upload to websites, and to aid briefing of tourists.

At the outset of the scoping study a series of questions were developed that the project had sought to answer. Findings from this scoping study are intended to be considered if further vegetable industry and nursery industry activities in the region are planned.

Recommendations

1. Investigate an opportunity to partner with the TSRA Sustainable Horticulture Project and provide support that would increase knowledge of crop production, crop protection, and pest surveillance at market gardens.

   (This may be in the form of sending industry representatives to hold pest management, biosecurity, or soil health workshops in these communities. Information provided by the vegetable industry about the nutritional value of different crops would also be beneficial for Torres Strait communities and would aid development of a partnership approach.)

2. Further investigate opportunities to supply awareness collateral for use at the future Lakeland Information Centre and to the Thoughtful Travelling Cape York Campaign.

3. Based on the location of each council and their proximity to major north-south transport routes, biosecurity partnerships with these authorities for the purpose of raising awareness among communities and tourists should be considered.

4. Investigate developing a biosecurity project for exotic horticultural pests that may be integrated into the regional school syllabus and completed by college students. Such a project may involve a pest surveillance element.

5. Investigate developing a biosecurity awareness training module and biosecurity awareness material for specific use by tourism and travel companies that cater to the region.

6. Authorities involved in planning locations of biosecurity signage and access to awareness material should consider the findings of the tourist survey in this report and place awareness collateral on the Mulligan Highway and southern section of the Peninsula Developmental Road.

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Appendix 1

Price of fresh produce in Seisia - May 2018

Commodity	**Price**
Sugar snap peas	$29.99/kg
Garlic	$21.99/kg
Broccoli	$5.99
Celery	$5.99
Celery half	$4.00
Silverbeet	$5.49
Pumpkin (Jap whole)	$2.49/kg
Potato (washed)	$3.59/kg
Carrots	$3.59/kg
Sweetcorn	$1.89/kg
Half cabbage (sugarloaf)	$4.00 each
Zucchini	$8.49/kg
Leeks (bunch)	$7.49/kg
Cabbage (whole green)	$7.99/kg
Cabbage (whole red)	$8.99 each
Snow peas	$33.00/kg
Eggplant	$8.49 each
Cucumber	$3.29 each
Iceberg lettuce	$2.99 each
Baby cos lettuce twin pack	$7.49 each
Capsicum (green)	$7.49/kg
Capsicum (red)	$10.99/kg
Capsicum (gold)	$15.99/kg
Tomato	$5.00/kg