

Chapter 11

Biosecurity

11.1 Fortunately and largely because of its geographic isolation, Australia's livestock remains free of all major epidemic diseases and relatively free of other serious pests and diseases. Australia also has a sound quarantine regime in place. The 2008 review of Australia's quarantine and biosecurity arrangements (the Beale Report) concluded that Australia operates a good system that is 'often the envy of other countries given its comprehensiveness, transparency, and scientific rigour'.¹ Even so, it recognised that improvements could be made to the arrangements with the aim of achieving 'a seamless biosecurity system that fully involves all the appropriate players...across pre-border, border and post-border risk management measures'.² Although this review did not deal specifically with the Torres Strait, its findings have direct relevance for the region.

11.2 Biosecurity is a critical aspect of conservation in the Torres Strait and the Treaty recognises this importance. As noted in chapter 2, Australia and PNG have undertaken to prevent the entry or establishment of species of fauna and flora that may threaten the health of indigenous animal and plant life. In this chapter, the committee identifies the main challenges facing the region from the introduction and spread of harmful weeds, pests and diseases. It also looks at the risk of damage to the environment from the release of toxic or harmful substances from vessels passing through the strait.

Biosecurity in Torres Strait

11.3 The proximity of the Torres Strait Islands to Australia's near northern neighbours, such as PNG, is one of the region's key biosecurity concerns. Less than five kilometres separates the northern-most island, Saibai, from the PNG coastline, with the remaining islands and reefs scattered throughout the region, forming stepping stones that provide an ideal route for the entry of harmful diseases or pests.³ The concern with the introduction of exotic diseases, pests or weeds is not so much coming from Australia northward to PNG but rather the converse.

11.4 There are several exotic pests and diseases of major concern to Australia that lurk on Australia's northern doorstep, including the screw worm fly (SWF), Asian

1 Roger Beale et al, *One Biosecurity: A working partnership*, The Independent Review of Australia's Quarantine and Biosecurity Arrangements', Report to the Australian Government, Commonwealth of Australia, 2008, p. xv.

2 Roger Beale et al, *One Biosecurity: A working partnership*, The Independent Review of Australia's Quarantine and Biosecurity Arrangements', Report to the Australian Government, Commonwealth of Australia, 30 September 2008, p. ix.

3 See for example, Mr Tim Chapman, *Committee Hansard*, 17 December 2009, p. 62.

tiger mosquito, papaya fruit fly and Japanese encephalitis (JE). Classical swine fever, which is a very serious exotic disease of pigs, is another. It has moved into West Papua and, according to Dr Andrew Carroll, Chief Veterinary Officer, DAFF, is 'likely, slowly but surely, to move across into PNG at some time'.⁴

11.5 These pests and diseases can be transmitted through human-assisted movement and natural dispersal. In the following section, the committee examines the potential for harmful pests or diseases to spread to the Torres Strait and the threat they pose to humans, livestock and the environment.

Human-assisted movement

11.6 Under the terms of the Treaty, Australia is required to permit free movement of traditional inhabitants who are undertaking lawful traditional activities in and in the vicinity of the Protected Zone. The presence in PNG of noxious pests and diseases not found in Australia coupled with the free movement provisions creates a significant risk to Australia's biosecurity.

11.7 Because humans or their companion animals are potential carriers of disease or pests, this flow of traditional inhabitants complicates the management of biosecurity in the Torres Strait.⁵ The committee has referred to PNG nationals crossing the border to seek medical assistance. Clearly, they pose a considerable risk of spreading infectious diseases such as tuberculosis. But any person visiting the Torres Strait from PNG to attend gatherings, hunt or trade could carry with them an exotic plant, pest or disease and inadvertently introduce them into the region. People who endeavour to gain entry illegally create a particular problem for biosecurity because their intention is to avoid detection.

11.8 The screw worm fly (SWF), an insect parasite of warm-blooded animals, is an example of a pest likely to be brought into the Torres Strait. This insect is considered to be the most exotic pest threatening Australia's livestock industries and is endemic in a number of Australia's northern neighbours, including PNG's coastal swamps adjacent to the Torres Strait.⁶ Dogs and humans are susceptible hosts of SWF. One study found that:

...companion animals, especially dogs, aboard illegal vessels represent a risk for the introduction of SWF larvae if the origin of the vessel is a SWF-

4 Dr Andrew Carroll, *Committee Hansard*, 17 December 2009, p. 63.

5 Mr Tim Chapman, DAFF, explained, 'The potential pathway of those going to the Torres Strait islands and then moving slowly southwards towards the mainland can be caused by a couple of factors. One is that humans carry them as they move...' *Committee Hansard*, 17 December 2009, p. 62. See also Dr Carroll, *Committee Hansard*, 17 December 2009, p. 63.

6 Animal Health Australia, 'About Screw Worm Fly,' <http://www.animalhealthaustralia.com.au/programs/drm/swf/screw-worm-fly-and-australia.cfm> and <http://www.animalhealthaustralia.com.au/programs/drm/swf/about-screw-worm-fly.cfm> (accessed 14 June 2010).

endemic country. Introduction of the disease through the Torres Strait into the mainland of Australia may also be possible via the legal importation of companion animals if these animals are not examined appropriately before entering the mainland.⁷

11.9 According to the Australian Veterinary Emergency Plan, should this pest reach Australia it would 'have disastrous effects on the cattle industry unless quickly controlled.'⁸

11.10 There are similar issues with regard to plant pests and disease being carried into the region by humans.⁹ Pests that are prevalent in PNG, such as the red-banded mango caterpillar and the papaya fruit fly, have been detected in the Torres Strait and require constant monitoring to contain any further incursions.¹⁰ For example, the number of papaya fruit flies detected in the Torres Strait is 'extremely high', with routine inspections finding 309 in 1995; 1,156 in 1998; 456 in 1999, 113 in 2001 and 118 in 2002.¹¹ It was first found in the Torres Strait in 1993 on Saibai, Boigu, Dauan, Stephen and Darnley Islands. A pest infestation can result in substantial losses in production, restrict market access and damage the environment.¹²

11.11 Commonly known as the climbing perch, *Anabas testudineus* is another example of a pest introduced by humans, in this case by Indonesian villagers. Dr Lawrence explained that people have dumped it in swamps and other places and it has migrated down the Fly River into the Fly estuary in PNG. He explained that although a nice fish to eat, it is a threat to bigger fish such as the barramundi that choke on its spines. According to Dr Hitchcock, that species is now found on Saibai and Boigu in the Torres Strait.¹³

7 Veronica Boero Rodriguez and Bo Raphael, *Review of the Old World Screw Worm Fly trapping program conducted by AQIS in the Torres Strait*, Bureau of Rural Sciences, July 2008, p. 16.

http://www.animalhealthaustralia.com.au/shadomx/apps/fms/fmsdownload.cfm?file_uid=2FE8B761-C7F7-918D-4DA1-C435A5FE2F9E&siteName=aahc (accessed 14 June 2010).

8 Australian Veterinary Emergency Plan (AUSVETPLAN), 'Disease strategy: Screw-worm fly (Version 3.0)', Canberra, 2007, Appendix 5.

9 Dr Carroll, *Committee Hansard*, 17 December 2009, p. 63.

10 See pamphlets on AQIS website, http://www.daff.gov.au/data/_assets/pdf_file/0017/120761/naqs_topwatch.pdf (accessed 14 June 2010).

11 Tom Kompas and Nhu Che, 'A Practical Optimal Surveillance Measure: The Case of Papaya Fruit Fly in Australia', Australian Centre for Biosecurity and Environmental Economics, Canberra, 2009, p. 14.

12 Tom Kompas and Nhu Che, 'A Practical Optimal Surveillance Measure: The Case of Papaya Fruit Fly in Australia', Australian Centre for Biosecurity and Environmental Economics, Canberra, 2009, p. 7.

13 *Committee Hansard*, 18 June 2010, p. 50.

11.12 Because of the high level of shipping traffic through the straits—recreational, commercial, indigenous and illegal fishing vessels—the region is also at risk from ships introducing invasive marine species. Some species of marine pests such as the Striped Barnacle and Upright Moss Animal can travel long distances as a fouler on ships' hulls. Their presence has been recorded in the Torres Strait. Pests can also be introduced through contaminated ballast.¹⁴

11.13 As shown in the illustration opposite, the activity of foreign vessels in the Strait may result in the introduction of weeds, pests or disease harmful to plant, animal or human health in the region.¹⁵

11.14 The transmission of human diseases such as dengue fever is another major biosecurity concern in the Torres Strait. A patient with dengue can transmit the virus to mosquitoes that may then infect other people. According to Queensland's management plan for dengue fever, 'It only takes one imported case of dengue to start an outbreak'. It explained:

Because dengue is not endemic to Australia, local dengue outbreaks in Northern Queensland all begin with a single imported case—a 'patient zero'.

11.15 For example, the outbreak in 1996–97 started with one person returning to Mer after contracting the disease in Daru. The management plan noted:

Because of high *Ae. aegypti* populations on Mer, this one case led to a further 70 cases on the island. Subsequent travel of viraemic patients between the islands led to infections on at least six other islands in the Torres Strait. Within seven months, 201 cases were confirmed, reaching locations as far south as Townsville.¹⁶

Natural dispersal

People and accompanying animals are not the only means by which noxious weeds and exotic pests and diseases find their way into the Torres Strait and then onto mainland Australia. Dr Andrew Carroll, DAFF, explained that there are many ways that things can come across from PNG besides the more commercial movements assisted by people: they can 'also float across, blow across, fly across and swim across'.¹⁷

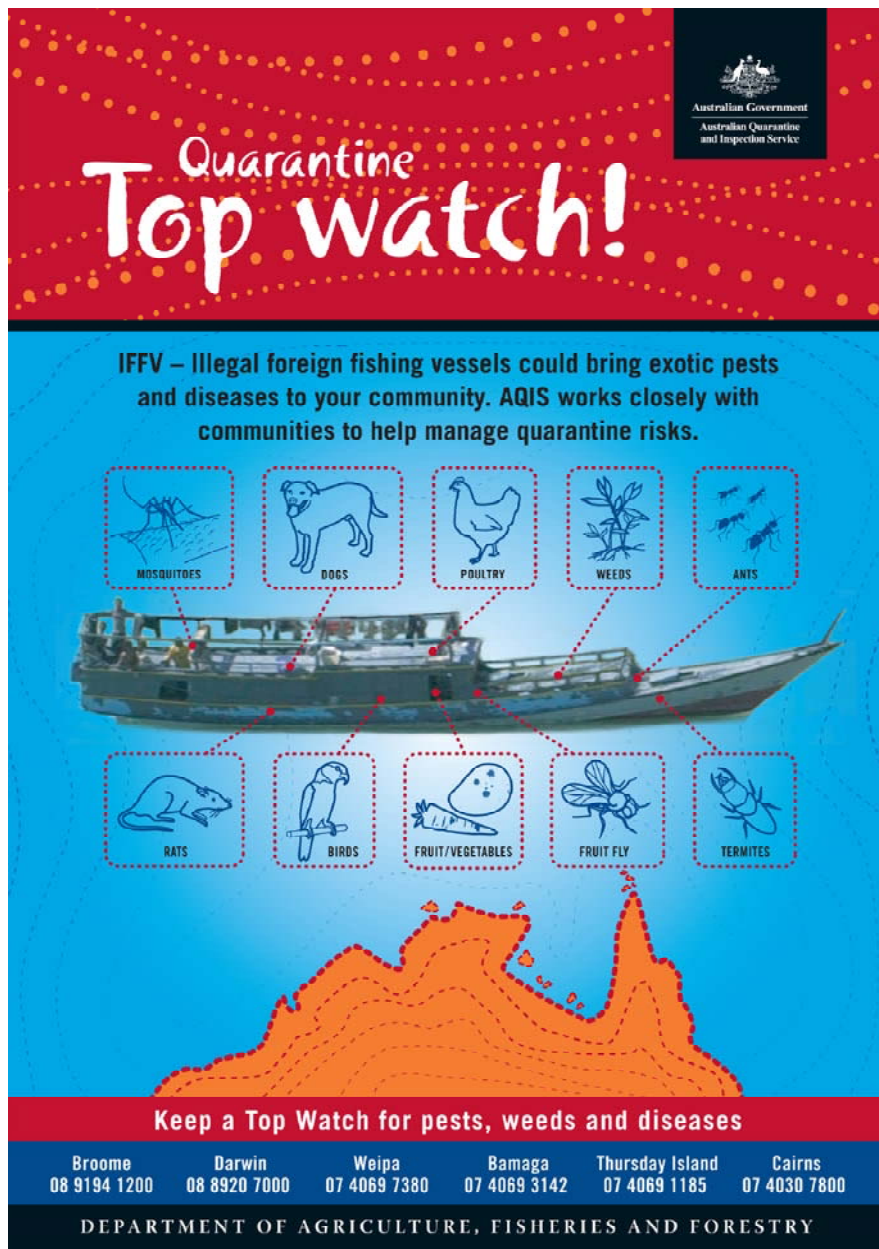
14 Heath Stafford and Richard C. Willan, *Is it a Pest? Introduced and naturalised marine animal species of Torres Strait Northern Australia*, CRC Torres Strait and Queensland Government, 2007, pp. 10, 12, 16, 18 and 20.

15 DAFF's website, http://www.daff.gov.au/data/assets/pdf_file/0009/790785/illegal-fishing-vessels.pdf (accessed 12 January 2010).

16 Queensland Health, *Dengue Fever, Management Plan for North Queensland 2005–2010*, Queensland Government, p. 16.

17 *Committee Hansard*, 17 December 2009, p. 63.

Figure 11.1: Quarantine poster—risks from illegal fishing vessels



(Image courtesy of Department of Agriculture, Fisheries and Forestry)

11.16 DAFF explained that the prevailing climatic and environmental conditions can 'facilitate the unassisted movement of risk organisms through natural pathways including seasonal wind and tidal actions and migratory bird movements'.¹⁸ Papaya fruit fly, for example, may not only be carried across the border in plant material but can be blown from the mainland to the islands.¹⁹

18 Department of Agriculture, Fisheries and Forestry (DAFF), *Submission 13*, p. 4.

19 Mr Chapman, *Committee Hansard*, 17 December 2009, p. 63.

11.17 The movement of nomadic waterfowl between northern Australia and PNG has been identified as 'a potential route for the introduction of avian influenza (AI) (and other disease agents) into Australia'. With islands located so close to PNG and hundreds and thousands of birds moving back and forth across the strait each year, it is 'the major bio-security threat for Australia' and 'the obvious pathway of any disease like bird flu moving into the country'.²⁰ Thus, there is an ever-present risk of the transmission of AI through infected birds.

11.18 Also, Ms Morris informed the committee that there has been 'a movement of a number of vectors into the Torres Strait and increased concern associated with the prevalence of new vectors and pests—fish and the like—that they have not seen there before'.²¹ One particular area of interest is mosquitoes, particularly the *Aedes albopictus*, commonly known as the 'Asian Tiger mosquito'. This mosquito is a potential vector of flaviviruses, including dengue and chikungunya, and Australian viruses such as Ross River virus and Barmah Forest virus.²²

11.19 As noted above, the dengue virus is not endemic to Northern Queensland but arrives via a human reservoir from outside the region. The disease is vectored by the dengue mosquito, an exotic but very human-associated species.²³ According to DoHA, there have been repeated incursions of the Asian Tiger mosquito in past years.²⁴ This mosquito, which is very aggressive, outcompetes the dengue mosquito and, although a poorer vector of dengue, feeds on more hosts and can transmit many more zoonotic diseases.²⁵ While not currently established in Australia, it presents a serious risk of spreading to the Torres Strait.

11.20 Another disease, Japanese encephalitis (JE), is endemic to PNG. This potentially fatal disease is caused by the JE virus and is spread by the bite of an infected mosquito. Pigs, which are particularly good hosts, and wild birds have an important role as hosts in the spread of the virus.²⁶ Mosquitoes feeding on infected pigs are likely to pick up the virus and may then transmit it to humans.²⁷ In 1995, JE

20 This view is based on a statement by Dr Rohan Clarke, a research fellow in the School of Life and Environmental Sciences in Deakin University, Media Release, 'Deakin University research maps bird flu pathways to Australia', 8 September 2008, <http://www.deakin.edu.au/news/upload/080908avianmalaria.pdf> (accessed 21 January 2010).

21 *Committee Hansard*, 25 March 2010, p. 41.

22 Dr Sheppard, *Committee Hansard*, 18 December 2009, p. 33.

23 Dr Sheppard, *Committee Hansard*, 18 December 2009, pp. 33 and 40.

24 *Submission 11*, attachment A, paragraph 3.2.

25 Margie Beilharz, 'Climate change raises the disease threat', *Science Alert*, 18 December 2008 and *Committee Hansard*, 18 December 2009, p. 33.

26 Professor John Mackenzie, Professor of Tropical Infectious Diseases, Curtin University of Technology, Perth, 'Emerging viral diseases: what are the threats and how should we respond?', *Safeguarding Australia 2007–2008, Public Lectures*, 4 September 2007.

27 Centre for Disease Control, Northern Territory, *Japanese Encephalitis*, web site.

first appeared in the Torres Strait on Badu. During the next couple of years, the virus recurred in the north of the Torres Strait, with a significant outbreak in 1998, when for the first time, the virus was detected further south in Cape York. Scientists were able to show that the virus found in Western Province, PNG, was genetically the same as the virus in Australia.²⁸ According to a researcher:

We think it [the virus] island-hopped, with localised transmission cycles between birds and mosquitoes—or perhaps pigs and mosquitoes—on each island, as it moved through the Indonesian archipelago, finally coming to Papua New Guinea and then down to the Torres Strait.²⁹

11.21 The concern now is that the virus will spread and become established further south.³⁰ In 2002, the virus was detected on Darnley soon after being found on Badu. At that time, the Northern Australia Quarantine Strategy (NAQS) noted that the end of the monsoon season and climatic conditions are perfect for an influx of JE-infected mosquitoes, blown south from PNG.³¹

11.22 The varroa mite, a highly invasive parasite that feeds on the blood of adult and larval honey bees, also poses a significant threat to Australian agriculture. According to Dr Carrol, DAFF, 'recent developments with varroa in PNG are of considerable concern, because varroa would be a serious pest for our honey bees'.³² These mites can establish themselves in other colonies by, for example, hitchhiking on an infected bee or through the activities of bee-keepers acting as agents, including through the use of contaminated equipment.

Increased risk

11.23 The committee has not identified all the weeds, pests or diseases present in PNG or Indonesia that have the potential to enter Australian territory through the Torres Strait and cause significant damage to sectors of Australia's farming industry, to the environment and to human health. According to an Animal Health Australia

28 Professor John Mackenzie, Professor of Tropical Infectious Diseases, Curtin University of Technology, Perth, 'Emerging viral diseases: what are the threats and how should we respond?', *Safeguarding Australia 2007–2008, Public Lectures*, Australian Academy of Science, 4 September 2007.

29 Professor John Mackenzie, Professor of Tropical Infectious Diseases, Curtin University of Technology, Perth, 'Emerging viral diseases: what are the threats and how should we respond?', *Safeguarding Australia 2007–2008, Public Lectures*, Australian Academy of Science, 4 September 2007.

30 Fiona Sinclair, 'Pest and Vector Control: Badu, Torres Strait Australia', *Journal of Rural and Tropical Health*, vol. 5, 2006, pp. 59–69.

31 Established in 1989 to address the unique quarantine risks in this northern region, NAQS conducts surveys along Australia's northern coastline and neighbouring countries for early signs of new pests or disease. DAFF website, <http://www.daff.gov.au/aqis/quarantine/naqs> (accessed 21 January 2010).

32 *Committee Hansard*, 17 December 2009, p. 63.

spokesperson 'it only takes one serious disease or pest to slip through to significantly disrupt our accepted way of life in Australia'.³³ Such infestation could result in the widespread destruction of plant and animal life and the cost of eradication could amount to millions of dollars.³⁴

Pests like fire ant, and invasive weeds, have already cost the nation dearly in foregone revenue and control measures.³⁵

11.24 Although the committee noted only a few examples of pest or disease intrusion into the region, the threat of such incursions is ever present and could be increasing.³⁶

Population movements

11.25 According to Dr Carroll, the risks of harmful exotic weeds, pests and diseases entering the Torres Strait are generally rising due to more trade and other activities involving the movement of people. He explained:

There was an outbreak last year or the year before of a very virulent form of newcastle disease up on the top of Papua New Guinea that had been brought in by, we believe, loggers coming in and bringing their fighting cocks with them...Also there are the risks coming across from Indonesia into Indonesian Papua and then moving across as more settlement develops there. Things like the big gas pipeline and various mining activities will mean a lot of mining equipment comes in. Unless great care is taken, that will introduce a whole range of soil-borne pests, particularly plant pests, and also hitchhiker pests—insects et cetera. So the risk in general, yes, is increasing.³⁷

11.26 Dr Garrick Hitchcock, an anthropologist who has worked on both sides of the border, also referred to population trends in PNG and likely implications for the Torres Strait. He said:

It is clear that a key issue for the region is Papua New Guinea's rapidly expanding population, which will have a profound impact on the future of Torres Strait, as more and more Western Province people use the waters for subsistence and cash-producing activities, and visit the Australian islands to

33 Animal Health Australia, Media Release, 'The other Border Security', 20 November 2004.

34 Tom Kompas and Nhu Che, 'A Practical Optimal Surveillance Measure: The Case of Papaya Fruit Fly in Australia', Australian Centre for Biosecurity and Environmental Economics, Canberra, 2009, pp. 13–14 and 23.

35 Animal Health Australia, Media Release, 'The other Border Security', 20 November 2004.

36 For information on the range of biosecurity threats to northern Australia see for example, Northern Australia Quarantine Strategy, *Quarantine Pocket Guide*, DAFF, 2005 and J.F.Grimshaw et al, 'The value of early detection and internal quarantine boundaries in the management of incursions: some examples in plant protection from northern Australia and Papua New Guinea', *ACIAR Technical Reports* No. 62, Canberra, 2006

37 *Committee Hansard*, 17 December 2009, p. 64.

access their infinitely better health and other services. When I commenced research at Bensbach in 1995, none of the locals had ever been to Torres Strait; more recently, it is quite common for sick and injured villagers to make the long journey to Boigu Island's clinic.³⁸

11.27 Although his main concern was with health problems due to increased numbers of PNG nationals visiting the region, his suggestion of increased subsistence and cash-producing activities in Western Province could have significant biosecurity consequences for the Torres Strait.³⁹

Climate change

11.28 The 2008 independent review of Australia's quarantine and biosecurity noted that the challenges from climate change were an emerging risk for Australia. It referred to an increased potential for pest and disease incursions as the number of viable natural pathways for exotic pests and diseases increase.⁴⁰ Ms Morris explained that the problems associated with rising sea levels 'will become more acute because of the inundation and because of the difficulties in habitation and then for straight-out biosecurity and security reasons'.⁴¹

11.29 Scientists have suggested that the life cycle of organisms in the region is likely to be influenced because of changes in climate. For example, CSIRO's research indicated that the main biosecurity threat to the Torres Strait Islands comes from climate change and the associated southern movement of key disease-vectoring mosquitoes from PNG and their potential to increase disease type and incidence.⁴² Dr Andy Sheppard, CSIRO, explained that the insects are very sensitive to small environmental changes, so their ability 'to survive and also transmit the diseases will be heavily temperature dependent'. In his opinion, climate data is a key variable that is going to change the impact or the virulence of this problem.⁴³

38 *Submission 30*, p. 1.

39 See also observations made by J.F.Grimshaw et al, 'The value of early detection and internal quarantine boundaries in the management of incursions: some examples in plant protection from northern Australia and Papua New Guinea', *ACIAR Technical Reports* No. 62, Canberra, 2006, p. 154. They noted the large-scale movement of people along the Indonesian archipelago, particularly to Papua (formerly Irian Jaya) which 'was changing the pest, weed, and disease spectrum on that land mass'.

40 Roger Beale et al, *One Biosecurity: A working partnership*, The Independent Review of Australia's Quarantine and Biosecurity Arrangements', Report to the Australian Government, Commonwealth of Australia, 2008, p. 3.

41 *Committee Hansard*, 25 March 2010, p. 40.

42 Dr Sheppard, *Committee Hansard*, 18 December 2009, p. 34.

43 *Committee Hansard*, 18 December 2009, p. 38.

11.30 According to Dr Sheppard, mosquitoes have expanded from PNG since about 2004 to most Torres Strait Islands, which may be linked to climate change.⁴⁴ He could not make a general observation about the risks of exposure as a result of the easy vectoring of diseases in the north because the research was 'very much ongoing'. Although scientists do not have a definitive answer yet, he suggested that if the predictions of those models were realised then, potentially, they would have quite a serious impact on the risks to which people are exposed in the region.⁴⁵ He noted further that while the broadly predicted changes in climate could have 'a significant impact', the predictive capacity is 'hampered by a lack of high-quality observational data'.⁴⁶ In fact, he explained that, because of a perceived level of increased risk, research started only about 12 to 18 months ago. He informed the committee:

So, while we believe the risk is on the increase, we have not been able to take it to the point where we can actually define how it might impact the local community. One reason we cannot do that is because there is a lack of detailed localised climate data that allows us to do climate modelling around the biology of the vector and the interaction between the vector and humans. We have these clear observations that the mosquitoes are on the move and we know about the biology and the interactions between mosquitoes as to how that might change the impact on the diseases, but I am afraid at the moment the rest is rather speculative and it really is dependent upon us having better data for some good biological modelling.⁴⁷

11.31 In summary, he stated:

It is a very complex question because it is not just a question of the impact of the climate change or increasing temperatures on the mosquito populations. It is also about that interaction between the mosquitoes and their ability to transmit the viruses. That is why we have started this research. It is to really bring the virologists and the entomologists back together to better understand the system.⁴⁸

11.32 As noted earlier, changes in climate may affect the life cycle of a range of organisms, and not just mosquitoes. For example, climatic conditions and other physical factors determine the potential for the SWF to survive and increase in number in a geographic area.⁴⁹ In the committee's view, there is a clear need for a comprehensive study of changes in climate and their implications for the Torres Strait as a single but complex ecosystem in the short and long term.

44 *Committee Hansard*, 18 December 2009, p. 33.

45 *Committee Hansard*, 18 December 2009, pp. 38–39.

46 *Committee Hansard*, 18 December 2009, pp. 33–34, 38.

47 *Committee Hansard*, 18 December 2009, p. 37.

48 *Committee Hansard*, 18 December 2009, p. 38.

49 Veronica Boero Rodriguez and Bo Raphael, *Review of the Old World Screw Worm Fly trapping program conducted by AQIS in the Torres Strait*, Bureau of Rural Sciences, July 2008, p. 13.

Conclusion

11.33 A number of exotic weeds, pests or diseases are present in Australia's near northern neighbours that, if introduced into Australia, could cause significant harm to people, animals, plants and other aspects of Australia's unique environment. As the main gateway through which such threats may enter Australia, the Torres Strait is a major biosecurity concern for the country. The region's isolation, low-density and dispersed population, proximity to an international border, geography and climate generate significant challenges for Australia's biosecurity. The free movement of local inhabitants allowed under the Treaty, projected population increase in PNG's Western Province, illegal activities, especially by unauthorised fishers, and climate change add to the difficulties facing those responsible for Australia's biosecurity in the Torres Strait. The following chapter considers how Australia attempts to manage the numerous biosecurity threats that exist in the region.