

Crocodiles and grey nomads: A deadly combination?

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There are increasing numbers of active Australian retirees, many who wish to travel in retirement. While they are superficially similar to the American ‘snowbirds’, unlike snowbirds, these Australian ‘grey nomads’ tend to seek individual, extended, unstructured activities with short stays in remote, non-commercial locations. Their travel is predominantly by self-drive 4WD vehicle and they tow a caravan/campervan, and prefer remote bush camping sites or caravan parks to the commercial resorts that American snowbirds prefer. The northern clines of Australia are a popular destination for grey nomads who largely originate from the major cities. These cities are largely outside of the tropics where Australia’s only large fierce animal, the estuarine or saltwater crocodile *Crocodylus porosus* inhabits. Successful crocodile conservation programs have substantially increased the numbers of this species throughout much of the coastal northern areas of Australia, the preferred destination of many grey nomads. We conclude that naïve grey nomads, encroaching into areas with increasing numbers of large crocodiles will result in increased attacks, and suggest that a strategic review of current conservation programs is required before public outcry for action against crocodile conservation efforts occurs.

Keywords retirees; *Crocodylus porosus*; wildlife conflict; wilderness recreation; Australian retirement trends; crocodile attack; self-drive holidays

Introduction - The issue

Australia has an aging, population (Tate, Freeman, Mein & Maguire, 2006; Higgs & Quirk, 2007). Based on trends in 2000, it was projected that in economically developed countries by around 2015, over 50.0% of a person's lifetime will be available for leisure (Molitor, 2000). This trend is driven by lower birth rates and greater longevity, and retirees are growing both in numbers and proportion of the total population (ABS, 2013). For example, Australians aged 65 ('retirement age') or over are projected to increase from 3.2 million (14.0% of the population) in June 2012 to between 5.7-5.8 million (18.0-19.4%) by 2031 (ABS, 2013), and the upward trajectory continues (Bolwellrv, 2014). However, available figures would be an underestimate of total retirees, as more Australians are choosing to retire before reaching 65. For example, around 40.0% of Australians aged 45 years or over were retired in 2007 (ABS, 2009). Wolcott (1998) confirmed this trend. She found that there was a 72.0% participation in the work force among males between the ages of 55-59, and 43.0% for women in this age bracket. The participation rate had dropped at 60-64 to 45.0% for men and 19.0% for women. These relatively wealthy, active retirees are the fastest growing segment of the tourism industry in Australia (Onyx & Leonard, 2005).

Most of the Australian population is urban-based. The population is concentrated in coastal areas and 64.0% reside in the eight state/territory capital cities, seven of which are coastal (ABS, 2012) and only one, Darwin, is within the tropics. It is widely accepted that there is a disproportionate focus on aquatic resources compared to alternative outdoor recreational opportunities and water-based recreation is a choice of people of all ages (Burgin & Hardiman, 2010; Hadwen, Arthington, Boon, Lepesteur & McComb, 2006). Such aquatic resources in Australia's tropics are

inhabited by the saltwater crocodile *Crocodylus porosus*, whose populations in both number and size of animals have increased dramatically in recent years owing to legal protection and conservation programmes (e.g., Webb, Britton, Manolis, Ottley & Stirrat, 2000).

In this paper we will explore the emerging trends of the penchant of a growing number of Australian retirees to seek new experiences, often in the tropical north of the country and thus exposing them to an increased risk of crocodile attack. We (i) review the emergence of the Australian ‘grey nomad’ tourism phenomenon; (ii) consider the associated potential for conflict between human safety and crocodile conservation; and (iii) suggest future social and ecological research priorities and/or management implications.

Grey nomads

Australian ‘grey nomads’, are typically retired men and women who travel independently (e.g., by caravan, motorhome or campervan) for extended periods around the island continent, typically from 3 months to several years. They ‘follow the sun’ and their own itinerary with the changing seasons (Onyx & Leonard, 2005, 2007). They are not time-constrained and their trip represents a lifestyle rather than a holiday. Such a lifestyle does not conform to social expectations enshrined in the traditional ‘rise and fall’ model of human ageing by which an individual’s physical and cognitive abilities grow through childhood and young adulthood, mature in middle age and subsequently decline thereafter (Leonard & Burns, 2001). This emerging lifestyle choice has been described as an ‘Ulyssean’ approach to ageing, by which individuals actively pursue personal choice and seek new experiences in later

life (Onyx & Leonard, 2007), and has the potential for challenging many aspects of medical and social planning (Higgs & Quirk, 2007; Tate et al., 2006).

Not all retirees seek the same experience. Various studies in Australia and internationally have identified different consumer segments, each with differing needs and motivations. Examples include ‘escapists and learners’, ‘retirees’ and ‘active storytellers’ among Americans (Shoemaker, 2000) and ‘nostalgics’, ‘friendlies’, ‘learners’ and ‘escapists’ among Australians (Clever, Muller, Ruys & Wei, 1999). In some respects, Australian ‘grey nomads’ are similar to American ‘snowbirds’. Snowbirds are seasonal migrants from cooler states of the Northern United States of America (US) and Canada who over-winter, typically at recreational vehicle resorts, in the warmer Southern US states, especially in Florida (Happel & Hogan, 2002; Smith & House, 2006). While sharing some superficial similarities; however, there appear to be substantial differences between Australian grey nomads and Northern American snowbirds. Snowbirds appear to be gregarious, seek structured recreational activities and stay the whole trip at a single, commercial resort. In contrast, although grey nomads do enjoy social networking with other travellers, they appear to place greater value on individual, unstructured activities and make relatively short stays in remote, non-commercial locations as part of an overall ‘journey’. They travel predominantly by self-drive 4WD vehicle, tow a caravan/campervan and prefer a mixture of remote bush camping and caravan park sites over commercial resorts (Onyx & Leonard, 2005, 2007).

While definitions differ between studies, and accurate quantification is problematic, approximately 22.0% of those over 45 years who are retired or semi-retired and have no children at home, or 20.0% of all Australian domestic overnight leisure visitors may be classified as grey nomads (TRA, 2007). This percentage of

travellers may be considerably higher in some destinations and/or mode of travel. For example, in Western Australia, grey nomads comprise 40.0% of visitors to caravan parks (TWATRA, 2007). The majority originate from Queensland (30.0%), Victoria (26.0%) and New South Wales (18.0%). The mean trip length was identified to be 212 nights, with an average of 104 nights spent in Western Australia. There is some indirect evidence of a winter south to north migration (Pearce, 1999) and a tendency to travel counter-clockwise around the country (TWATRA, 2007). The northern states of Queensland, Northern Territory and Western Australia are especially popular among grey nomads as they offer opportunities for sought experiences such as freedom, independence and adventure in remote wilderness (Onyx & Leonard, 2005, 2007). All three states have low resident populations, highly concentrated in their respective capital city and each receives relatively high numbers of domestic visitors annually (Table 1).

Dangers of outdoor recreation

Most recreation outside of the tropics presents limited danger from Australian native wildlife. While there are a wide range of venomous animals, bites occur infrequently and deaths are rare (White, 1995, 1998; White, Pounder, Pearn & Morrison, 1985). Although snakes are the most common cause of such human fatalities (White, 2000), the number of deaths has been declining annually in recent decades (Currie, 2004; Mirtschin, Masci, Paton & Kuchel, 1998; Sutherland & Leonard, 1995). Arthropod bites (e.g., spiders, ants, centipedes), although medically significant, seldom result in death. There are also substantial numbers of marine invertebrates that are venomous or poisonous, including jellyfish (e.g., box jellyfish *Chironex fleckeri*), stinging fish, blue ringed octopus (*Hapalochlaene* spp.) while seas snakes are also venomous

(White, 1998). Shark attacks, although widely publicised and frequently fatal, are actually rare since throughout the last two centuries less than one person has been killed annually by such attacks in Australia (Caldicott, Mahajani & Kuhn, 2001). Among terrestrial vertebrates there have been two deaths due to attack from semi-domesticated dingos (Ayers Rock [Uluru] – Marcus, 1989; Fraser Island - Peace 2002), and there have been several recorded non-lethal attacks (Peace, 2002; Cartwright, 2011, Crawford, 2012). Outside of the tropics, there are no vertebrates that have the potential to attack and kill adult humans. Most Australians are, therefore, not confronted with the issues associated with dealing with large, wild and dangerous animals. Within the tropics; however, the saltwater crocodile *Crocodylus porosus* is increasingly becoming the exception.

Australian crocodiles

Two crocodile species inhabit Australian waters; the saltwater or estuarine crocodile and the freshwater crocodile *Crocodylus johnstoni*. Both species have a range that includes much of Northern Australia; Queensland, the Northern Territory and Western Australia, encroaching only marginally below the Tropic of Capricorn in coastal Queensland and Western Australia. While both species are concentrated in coastal areas, they may disperse considerable distances inland during wet season flooding. Where it occurs, the saltwater crocodile is a keystone species with the only other saltwater crocodiles and humans as potential enemies. Historically, populations have been limited naturally only by available food and habitat (Webb & Manolis, 1998).

Although attacks on humans by freshwater crocodiles have been recorded (e.g., Caldicott, Croser, Manolis, Webb & Britton, 2005; Lindner, 2004), this species

has a diet made up largely of fish and crustaceans (Webb & Manolis, 1993) and is generally regarded as being inoffensive unless provoked, for example when protecting eggs or hatchlings. In contrast, the saltwater crocodile has been implicated in unprovoked attacks on humans involving injury or death, both in Australia and elsewhere within its South-east Asian range (Caldicott et al., 2005). This crocodile is one of the largest of its kind in the world and has a predilection for hunting humans (Burgin, 1981). Despite its common names (saltwater, marine) implying that it is associated with the mouths of rivers and beyond, it may be found anywhere in a river system, including swamps, billabongs, and headwater habitat provided there is sufficient water (Burgin, 1981; CSG, 1996). Their Australian habitat, north of the Tropic of Capricorn (Webb & Manolis, 1993), is the least populated by humans (ABS, 2012) but increasingly popular with grey nomads (Onyx & Leonard, 2005).

Saltwater crocodiles are ambush predators and may lie submerged in wait for prey for two to three hours before launching an explosive attack. Despite their large size and weight, they are capable of moving fast over short distances, even on land. In water they are extremely agile and capable of leaping their own body length vertically above the surface. Their jaws are powerful, capable of crushing turtle shells and pig skulls, with biting force proportional to crocodile size. Small prey is swallowed whole, while large prey is broken up by head whipping and/or violent body rolling (Caldicott et al., 2005).

As in Papua New Guinea (Burgin, 1981), crocodiles have been hunted in Australia by aborigines for their food and livelihood during the last 2,000 years and animals and eggs continue to be collected. While their impact on crocodile populations is unknown, aborigines are skilled hunters, may know the position of all nesting sites within an area, and do kill the female guarding the nest and remove her

eggs. In heavily hunted areas, freshwater crocodiles are wary of humans (Webb & Manolis, 1993). However, the landscape is now 'very sparsely populated' outside of urban centres (Yibarbuk, Whitehead, Russell-Smith, Jackson, Godjuwa, Fisher, Cooke, Choquenot & Bowman, 2001). Presumably, this has reduced pressure on crocodile populations and wariness of humans would become less intense over time.

Europeans settled Northern Australia during the first half of the 1800s. Crocodiles were apparently widespread, sometimes abundant but patchy in distribution. With the establishment of the cattle industry saltwater crocodiles were treated as vermin (Webb & Manolis, 1993) although since most crocodile habitat tends to be at the mouth of the rivers in areas of mangroves and swamps, and without the convenience of modern equipment, the overall impact on the population was probably not substantial. Crocodile numbers may even have increased following European settlement as aborigines began to congregate around settlements and spent less time in traditional hunting (Webb, Messel, Crawford & Yerbury, 1987).

Although there were some isolated attempts to develop a commercial skin trade in the early 1900s (Cole, 1992), 'serious commercial crocodile hunting' targeting saltwater crocodiles commenced after World War II. Between 1946 and 1960 the rivers of Northern Australia were systematically and efficiently hunted until large crocodiles became scarce across the whole region. Populations in wetlands closest to settlements were most heavily hunted and, in addition to hunting for skins, crocodile hatchlings and small juveniles were also collected for the curio trade. By the end of the 1960s, populations had dwindled, there were few professional fulltime hunters and the few remaining large animals had become increasingly wary of humans (Webb & Manolis, 1993).

As a result of such impacts, saltwater crocodiles became protected in Western Australia in 1969 (*C. Johnstoni*, 1962), the Northern Territory in 1971 (*C. Johnstoni*, 1964), and in Queensland in 1974 (*C. Johnstoni*, 1974) (Letts, 2004). Additional protective legislation was provided by the Federal Government's *Environmental Protection and Biodiversity Conservation Act 1999*, and they remain on Appendix II of the *IUCN Red List of Threatened Species* (CSG, 1996). This protection has provided the basis for recovery (Stirrat, Lawson, Freeland & Morton, 2001).

By the 2000s, saltwater crocodile populations across their Australian range (Western Australia – CALM, 2003, Northern Territory – Webb et al., 2000; Queensland – Read, Miller, Bell & Felton, 2004) had greatly increased (Webb et al., 2000), reflected in their change in status from Appendix I to Appendix II (Caldicott et al., 2005). Saltwater crocodiles in the Northern Territory increased from an estimated 3,000 to 5,000 in 1971, to more than 75,000 non-hatchlings in 2004 (Letnic, 2004) and Queensland's non-hatchling population was estimated to be approximately 4,300 in 2004 (Read et al., 2004). In Western Australia, while there have been no recent state-wide surveys, it was estimated that in 1986 there were approximately 2,500 non-hatchling crocodiles in the Kimberley region alone (Mawson, 2004). The increase in saltwater crocodile populations has also been marked by an associated growth in average animal size (Webb, *et al.*, 2000).

Internationally, evidence suggests that successful conservation and management regimes that have led to increased populations have been paralleled with increases in crocodile attacks on humans (Caldicott et al., 2005). For example, Andau, Ambu & Tsubouchi (2004) concluded that increased crocodile numbers have resulted in greater numbers of attacks on humans in Sabah and Malaysia, while Glasgow (1991) suggested that a combination of increased numbers of American alligators and

a parallel expansion of the human population in Louisiana during the 1970s resulted in increased confrontations between humans and alligators. In northern Australia between 1971 and 2004 there has also been an increased frequency of crocodile attacks on humans (Caldicott et al., 2005, Table 2).

Factors that increase confrontations between humans and crocodiles include increased human populations, development of the crocodile's habitat, and increased popularity of water-based recreational activities (Caldicott et al., 2005). As indicated above, the successful crocodile recovery program in Australia has resulted in an increasingly large population of crocodiles of increased size associated with reduced levels of wariness of humans because they have not been exposed to intense hunting pressure for over three decades (Webb *et al.*, 2000). Females reach sexual maturity at approximately 12 to 14 years old (approximately 2.2-2.4 m), and males at around 16 years (approximately 3.0-3.6 m) and they continue to grow to 7 m (Webb, Messel, Crawford & Yerbury, 1978, 1978). Fatal attacks are generally by large (> 4 m long) male crocodiles (Caldicott *et al.*, 2005). There are therefore likely to be a large number of large crocodiles that have not learned to be wary of humans.

Clash between grey nomads and crocodiles

This increase in the number of large crocodiles across Northern Australia has been paralleled with the growing numbers of grey nomads in the area, originating from the southern half of the continent (i.e., outside of the range of crocodiles).

While not as low as shark attacks (i.e., an average of 1.1 annually for the 20 years to 2011, West, 2011) but with a moderate increase subsequently (McPhee, 2014), crocodile attacks in Australia have remained relatively rare (Table 3). However, while there appears to have been a general decline in shark populations

(e.g., Baum, Myers, Kehler, Worm, Harley & Doherty, 2003, 2004; Heithaus, Wirsing, Dill & Heithaus, 2007; Robbins, Hisano, Connolly & Choat, 2006), the trend for increasing numbers of large crocodiles over the last two decades is the reverse, and they are less wary of humans than pre-protection populations (Webb *et al.*, 2000). In parallel, the numbers of grey nomads without experience of potentially dangerous animals but seeking the solitude of wilderness are increasing (Onyx & Leonard, 2005) and there has been an upward trend in crocodile attacks from 0.5 annually between 1971 and 1980 to 2.9 annually between 2001 and 2010, with a rise to 3.25 post 2010 (Table 2). Without intervention, it can be assumed that the increasing numbers of crocodiles and grey nomads will continue. This will increase the likelihood of each to encroach on the ‘territory’ of the other and thus the risk of attacks will become more acute.

In New South Wales and Queensland, the main response to the threat of shark attack on humans has been the long-term and deliberate attempt to reduce their numbers through gill netting, in Queensland supplemented with baited drumlines (Dudley, 1997). In addition to impacting the target species; however, large numbers of non-target species, including protected species of other sharks, cetaceans, fish and marine invertebrates also continue to perish annually in such nets (Hardiman & Burgin, 2010). An increase in crocodile attacks will undoubtedly elicit a community outcry for their control, and in some quarters probably eradication.

Conclusion and recommendations

Crocodile conservation efforts in Australia have been a resounding success (Hutton, Ross & Webb, 2001). However, along with every silver lining comes a cloud. With increasing numbers of grey nomads encroaching on the territories of increasing

numbers of large crocodiles, without additional action by land management agencies it is highly probable that the number of crocodile attacks on humans resulting in serious injury or death will increase and ultimately there will be community demand for action, most likely the permitting of commercial hunting and/or increased culling of the species. To avoid the need to react to such disquiet, we suggest that strategically there is a need for immediate action. This is because the most successful conservation programs for crocodiles have been based on broad input during the preparation and implementation that accounted for the prevailing socio-economic environment (Hutton et al., 2001). A review of the current approach to crocodile management in Australia would therefore be best achieved before community emotions were inflamed by escalating numbers of crocodile attacks. There is, therefore, a need for (i) social research on travel patterns and/or knowledge of crocodile danger among grey nomads; (ii) better publication and encouragement of people to report non-fatal attacks [only fatal attacks tend to get reported]; (iii) more investment to allow better shared database knowledge of crocodile attacks across the three northern states, similar to shark databases; and (iv) increased education targeted specifically at the grey nomad tourist.

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Table 1: Northern Australian state populations for 2007 (source ABS, 2012) and 2008-2009 domestic overnight visitor nights (TRA, 2010 a, b, c, d, e, f).

State/Region	Region % share of state domestic overnight visitors	% share of region domestic overnight visitors by retirees	% share of region domestic visitor nights by retirees
¹ Queensland			
<i>Outside of crocodile range</i>			
Gold Coast	19.7	16.2	23
Brisbane	28.8	18.3	27
Sunshine Coast	14.3	15.0	23
² Hervey Bay	6.9	28.8	43
Darling Downs	6.5	19.4	20
Bundaberg	3.4	24.8	43
Outback	3.2	24.3	49
<i>Inside crocodile range</i>			
Fitzroy	5.8	19.0	30
Mackay	3.6	14.9	37
Whitsundays	2.5	19.7	20
Northern	5.3	20.5	29
Tropical	9.3	17.5	24
<i>Total State</i>	100	17.0	28
³ Northern Territory			
<i>Outside of crocodile range</i>			
MacDonnell	6.0	na	Na

Petermann	14.0	26.0	28
Alice Springs	21.5	23.4	31
Tablelands	6.9	na	na
<i>Within the crocodile range</i>			
Darwin	56.0	19.7	30
Kakadu	11.6	25.8	34
Arnhem	4.6	na	na
Katherine	15.3	28.7	45
Daly	4.9	Na	na
Total state	100.0	15.2	32
 ⁴ Western Australia			
<i>Outside of crocodile range</i>			
South West	30.6	17.2	22
Perth	48.4	15.9	23
Outback	11.9	20.1	25
Total state	100.0	16.1	26
<i>Inside crocodile range</i>			
Coral Coast	8.6	23.8	40
North West	8.3	18.6	33

¹ Queensland residents - 4,181,000 (capital - 1,857,000); Domestic overnight visitors – 16,121 (4,647)

²Includes Mayboro

³ Northern Territory residents – 215,000 (capital – 117,000); Domestic overnight visitors – 1,072 (600)

⁴ Western Australia residents – 2,106,000 (capital – 1,554,000); Domestic overnight visitors – 5,514 (2,670)

Table 2: Mean number of saltwater crocodile attacks per year in the Northern Territory and Australia 1971-2010

Period	Fatal	Non-Fatal	Total
<i>Northern Territory</i>			
1971-1980	0.2	0.0	0.2
1981-1990	0.4	1.0	1.4
1991-2000	0.2	1.2	1.4
2001-2010	0.7	1.2	1.9
2011-2014	1.25	1.25	2.50
<i>Australia overall</i>			
1971-1980	0.4	0.1	0.5
1981-1990	0.8	1.2	2.0
1991-2000	0.3	1.9	2.2
2001-2010	1.0	1.9	2.9
2011-2014	1.25	2.0	3.25

Source: 1971-2004 - Caldicott *et al.*, 2005; 2005-2010 – collated by authors from reports of the Crocodile Specialist Group, Sydney Morning Herald and Australian

Broadcasting Corporation; 2011-2014 – collated by authors and confirmed by
Crockett, 2011

Table 3: Number (percent of all attacks) of saltwater crocodile attacks in the wild in northern Australia 1971-2014

Number (percent) of all attacks				
Attack type	Northern Territory	Queensland	Western Australia	All states
Fatal	20 (33.9)	8 (38.1)	2 (18.2)	30 (32.3)
Non-Fatal	39 (66.1)	13 (61.9)	11 (81.8)	63 (67.7)
Total	59 (63.4)	21 (22.6)	13 (14.0)	93 (100.0)

Source: 1971-2004 - Caldicott *et al.*, 2005; 2005-2010 – collated by authors from reports of the Crocodile Specialist Group, Sydney Morning Herald and Australian Broadcasting Corporation; 2011-2014 – collated by authors and confirmed by Crockett, 2011