

Monitoring of Coastal Sea Turtles: Gap Analysis

6. Leatherback turtles, *Dermochelys coreacea*, in the Port Curtis and Port Alma region

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Background

This study has been undertaken to provide a review and summary of available scientific literature and data on marine turtles in Central Queensland, particularly the Port Curtis and Port Alma region, and if required, expand the extent to consider turtle information for Queensland:

- Identify and update baseline data for suitable turtle habitat in the Port Curtis and Port Alma region at a distance of 500km north of Port Alma and south of Port Curtis
- Assess whether the available historical survey data are sufficiently robust to permit trend analyses. If so, undertake a trend analysis; undertake a formal power analysis of the reviewed data, if appropriate;
- Conduct a quantitative analysis of the historical trends in marine turtle numbers for the Port Curtis and Port Alma region; and
- Identify the migratory links between resident foraging turtles in the Port Curtis and Port Alma region and their nesting areas.

The leatherback turtle, *Dermochelys coreacea* (Figure 1), has a global distribution, occurring in all oceans. The biology and conservation status of leatherback turtles has been reviewed at a global scale by Eckert *et al.* (2012), in the Indian Ocean and western Pacific Ocean by Hamann *et al.* (2006) and in Australia by Limpus (2009).

Status

Within Australia, the leatherback turtle is scheduled as an endangered species under both the Queensland and Federal conservation legislation and associated regulations, *Nature Conservation Act 1992* and *Environment Protection and Biodiversity Conservation Act 1999*, respectively.

Data sources

This gap analysis has drawn on information available in the published literature and in the two primary computerised data bases with the Queensland Department of Environment and Heritage Protection (EHP).

Queensland Turtle Conservation database

EHP maintains a database that incorporates all tagging records for Queensland, incidental sighting records, nesting distribution and migration data for marine turtles in Queensland.

StrandNet

EHP maintains a database collating reports of sick, injured and dead marine wildlife (Cetaceans, dugong, turtles, threatened sharks and grouper) in Queensland (Biddle and Limpus, 2011). This data base includes turtle mortality from the Queensland Shark Safety Program.

These data sets have been supplemented with data sets managed by Dr Limpus which summarise international nesting and migration.

Index study sites

Nesting:

Wreck Rock Beach (24.3167°S, 151.9667°E): This 22km long beach between Red Rock and Deepwater Creek south of Agnes Water has been monitored for leatherback nesting activity since the December 1978. The beach has been monitored nightly for a minimum of five weeks (last two weeks of December and first three weeks of January) or longer each summer.

Foraging

The Queensland Shark Control Program leatherback turtle by-catch on the Point Lookout, North Stradbroke Island (-27.4379°S, 153.5516°E) drum-lines has served as an index of abundance of leatherback turtles swimming along the southeast Queensland coast. These turtles snag on a standard set of 24 hooks dangling from floating buoys for catching sharks (Sumpton *et al.* 2011) along the northern eastern coast of North Stradbroke Island. The captures does not involve turtles attempting to ingest the baits/hooks. The data set spans from July 1984 to the present under the supervision of a single contractor to the site.

Nesting population

The breeding population of eastern Australia (Figure 2) was discovered in the early 1970s when there were about 3 female leatherback turtles nesting annually on Wreck Rock Beach. Nesting was regularly encountered on all beaches from Wreck Rock Beaches south to Moore Park Beach (24.7333°S, 152.3333°E). Isolated nesting leatherback turtles were recorded as far north as Mackay (21.0333°S, 149.1667°E), and Mon Repos (24.8°S, 152.45°E), and Sandy Cape (24.7°S, 153.25°E) in south Queensland and at Ballina (28.8667°S, 153.5833°E) and Forster (32.2°S, 152.533°E) in New South Wales.

The population was in decline when discovered and no leatherback turtle has been detected in eastern Australia since February 1996. No threatening processes were identified at the nesting beaches during the 1970s and 1980s that could account for this loss of nesting in eastern Australia. The decline in eastern Australia has occurred during the period of decline through out the Pacific Ocean for this species in recent decades (Spotila *et al.* 1996; Tapilatu *et al.* 2013). This Pacific-wide decline in leatherback turtle breeding numbers has been attributed primarily to fisheries bycatch mortality and excessive loss of eggs at the nesting beaches.

Limpus (2009) provides a summary of the size of nesting females, clutch counts, egg dimensions, and hatchling size for the eastern Australian breeding population.

Stock identification

No analysis has been made of the small eastern Australian nesting population to determine its genetic relationship to other leatherback turtle genetic stocks in the Pacific Ocean (Limpus, 2009; Dutton *et al.* 2007). The nearest leatherback nesting population to the east Australian rookeries occurs in Solomon Islands (Figure 2). The leatherback turtles that nest across northern New Guinea (Indonesia and Papua New Guinea) along with those that nest in the Solomon Islands constitute a single genetic stock for the species (Dutton *et al.* 2007).

Migration

There are no tag recoveries or satellite telemetry tracking from leatherback turtles tagging in eastern Australia to link their nesting beaches to foraging areas.

Based on satellite telemetry of turtles tagged as nesting females at overseas rookeries, the foraging leatherback turtles that occur in the Coral Sea and Tasman Sea, including eastern Australian waters, most likely originate from the nesting beaches of northern New Guinea (Indonesia and Papua new Guinea) and possibly Solomon Islands (Benson *et al.* 2011) (Figure 3).

Foraging population

Within Australia, the leatherback is most commonly encountered in southern Australian waters (Limpus, 2009). Most sightings and captures of leatherback turtles in Queensland waters have occurred from Hervey Bay south to the Gold Coast. Leatherback turtles are rarely encountered in the waters of the Great Barrier Reef and hence are rarely encountered in the waters in the vicinity of Port Curtis and Port Alma (Figure 4). Almost all reported leatherback turtles at sea in Queensland are in the size range of large immature and adult turtles

While leatherback turtles are regarded as open ocean pelagic foraging turtles, they are commonly encountered in surface waters over the Australian continental shelf.

There is no indication that leatherback turtles establish restricted foraging home ranges as occurs with the more common coastal foraging Cheloniid turtles. Rather, they appear to wander widely as they forage on gelatinous macroplanktonic species, including jellyfish (Benson *et al.* 2011). There have been no dedicated diet studies of leatherback turtles in eastern Australia. However, they have been regularly reported to feed on *Catostylus* jellyfish in our coastal waters (Figure 5).

Table 1 summaries the identified cause of leatherback turtle mortality from anthropogenic sources in eastern Queensland for the 23 years, 1990-2012. The combining the death rates during this period from entanglement in crab fishery gear, entanglement in Queensland Shark Safety Program (QSSP) nests, hooking on QSSP drum-line hooks, ingestion of synthetic debris and boat strike gives a total death rate from anthropogenic sources = 0.57 leatherback turtles per year.

The declining numbers of foraging leatherback turtles being encountered as by-catch with the Queensland Shark Safety Program over recent decades in south east Queensland (Figure 6) is consistent with the pacific-wide decline in the species (Spotila *et al.* 1996; Tapilatu *et al.* 2013).

Any mortality that is the result of human activities in Queensland waters is contributing to the decline of this endangered species.

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A. Adult female, nesting at Moore Park Beach.



B. Hatchling

Figure 1. Leatherback turtle, *Dermochelys coriacea*, in eastern Australia.

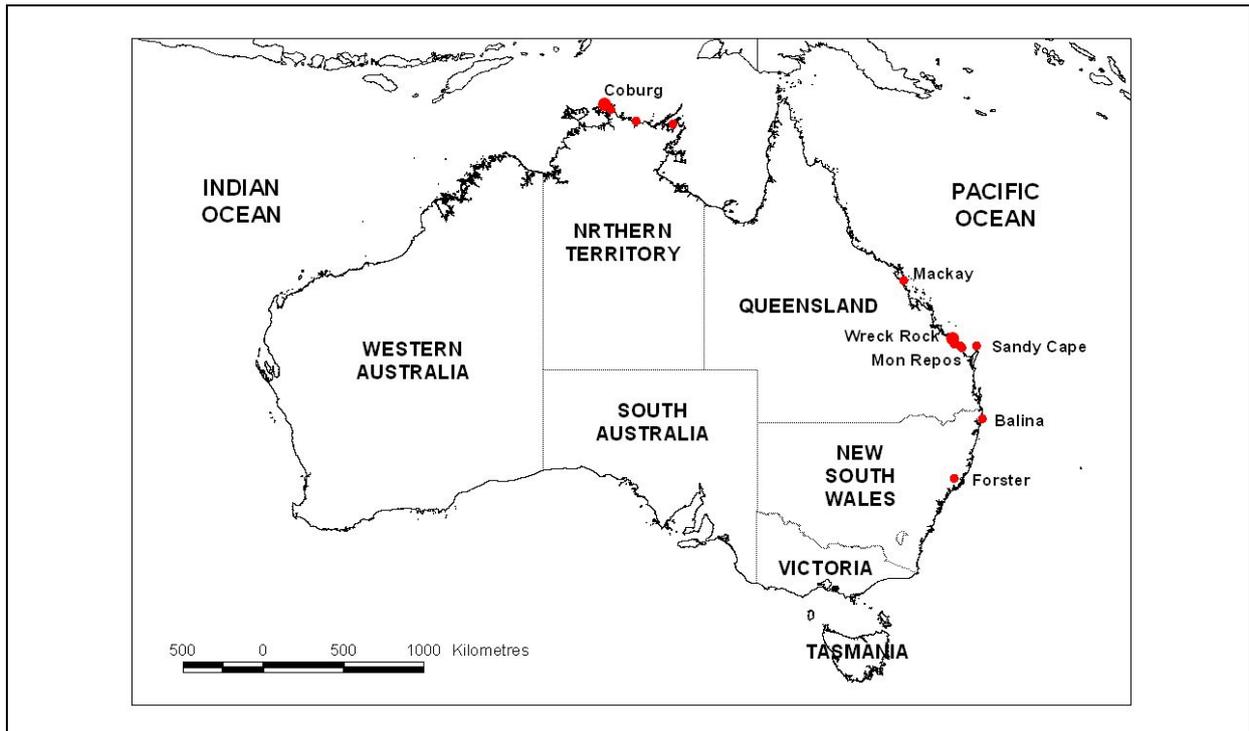


Figure 2. Leatherback turtle, *Dermochelys coriacea*, nesting distribution in eastern and northern Australia. Red dots denote recorded nesting localities.

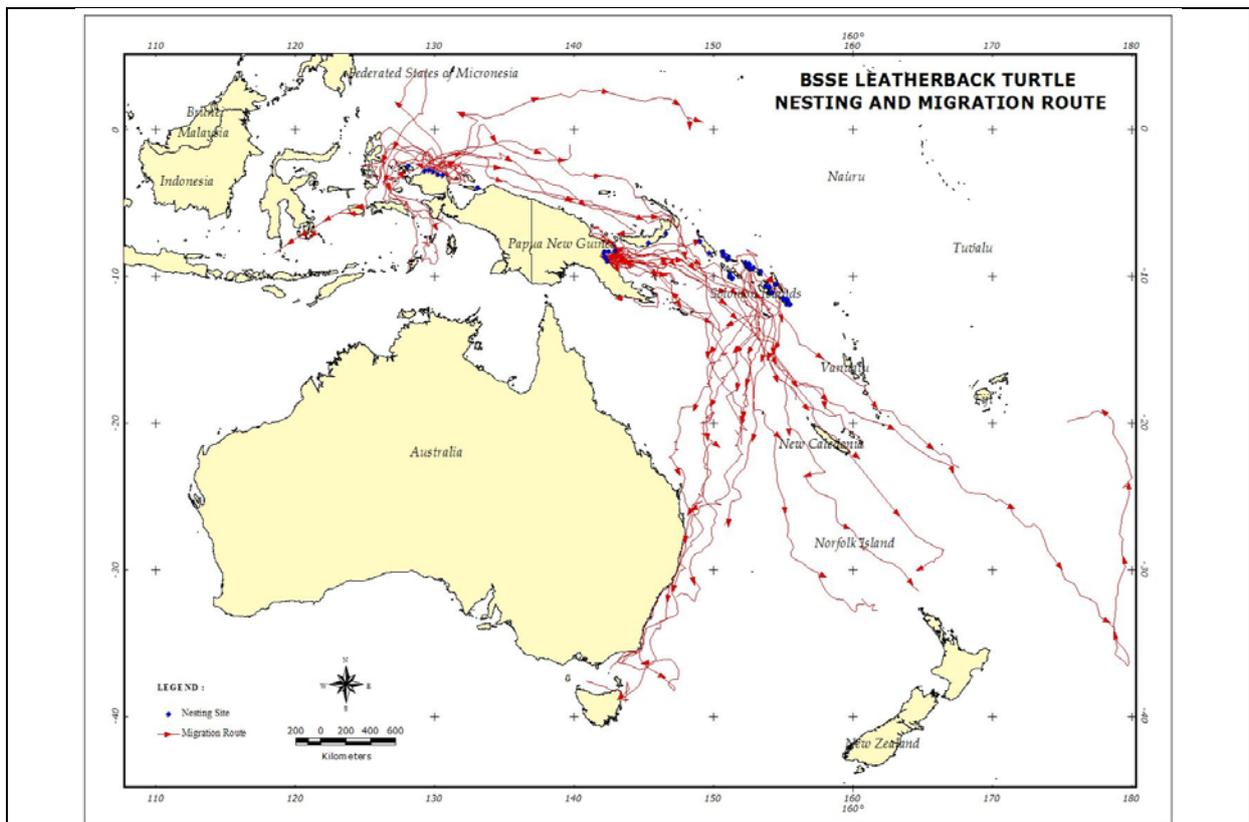


Figure 3. Post breeding migratory tracks identified by satellite telemetry for adult female leatherback turtles, *Dermochelys coriacea* tagged while nesting on the north coast of New Guinea. Image supplied by Dr Peter Dutton. See Benson *et al.* (2011) for a more comprehensive description of the migration into the south western Pacific Ocean.

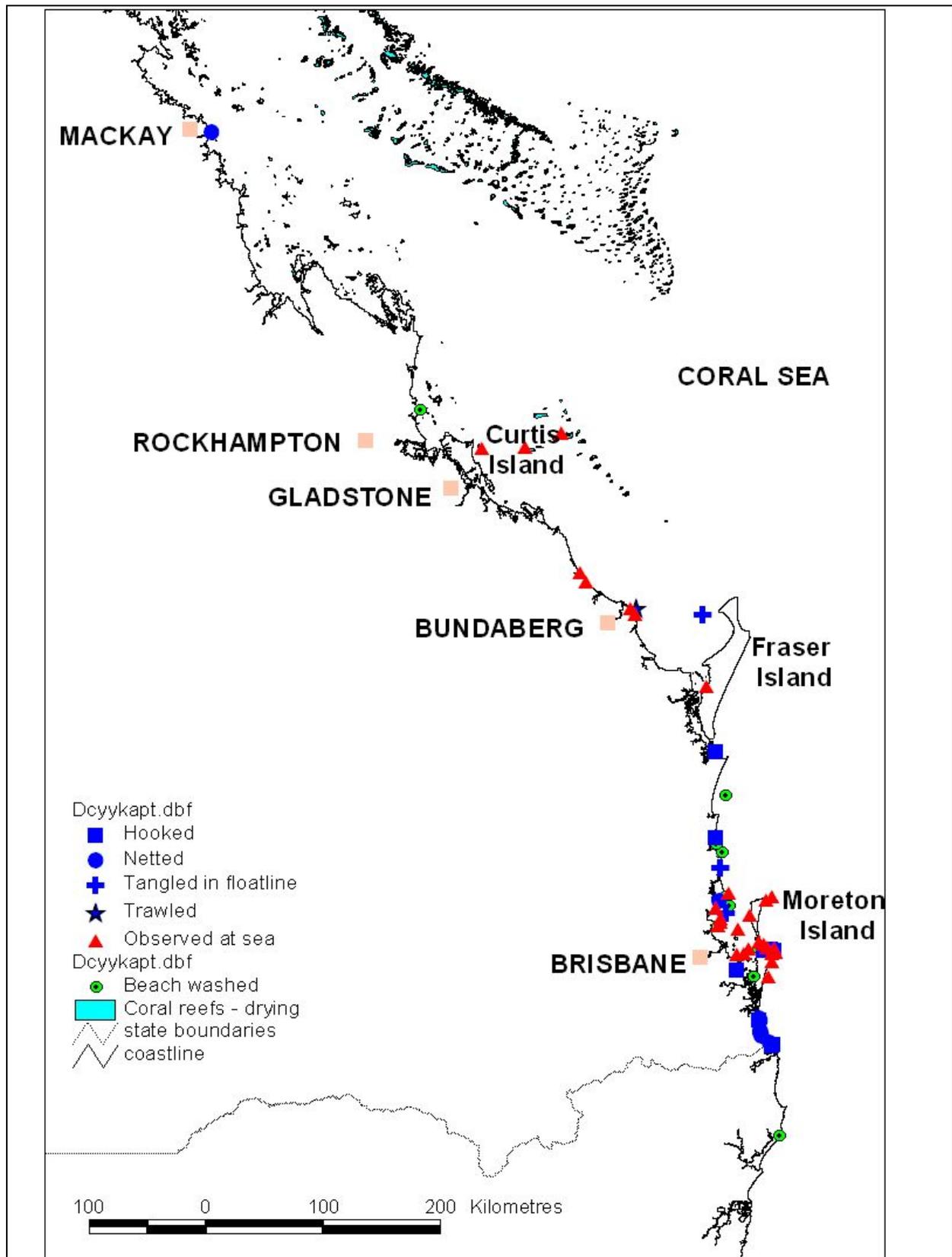


Figure 4. Records of non-nesting (presumed foraging) leatherback turtles, *Dermochelys coriacea* in south and central Queensland. Data derived from EHP Queensland Turtle Conservation data base and StrandNet.



Figure 5. *Catostylus* jellyfish identified in the diet of leatherback turtles by necropsy: Adult male, beach washed on Bribie Island, June 2000.

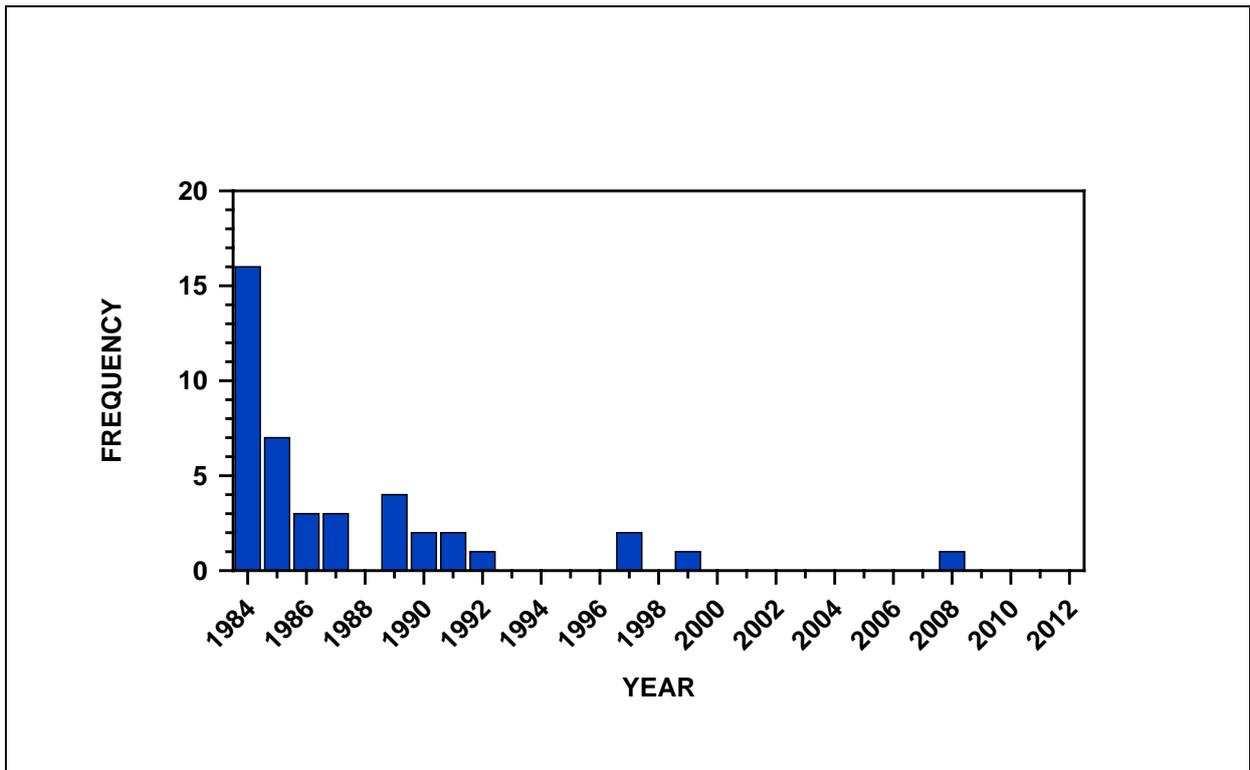


Figure 6. Declining annual capture of *Dermochelys coriacea* on Queensland Shark Control drumlines at Point Lookout as an index of abundance of the species in southern Queensland waters (After Limpus, 2009). Data set supplied by Queensland Shark Control Program and commences with the employment of the current contractor in 1984. The fishing effort has been approximately constant with 24 drum-lines deployed in approximately the same locations in each year. The turtles were tangled, not hooked, and almost all were released alive. 1984 data from July-December only.

Table 1. Frequency of recorded leatherback turtle, *Dermochelys coriacea*, mortality from anthropogenic sources in south east Queensland waters by year and cause of death (StrandNet data).

Year	Source of mortality				
	Entangled in crabbing gear	Entangled in QSSP net	Hooked on QSSP drum-line	Ingested synthetic debris	Boat strike
1990		1			
1991					
1992	1				
1993					
1994					
1995					
1996		2			
1997					
1998					
1999	1				
2000				1	
2001					
2002					
2003					1
2004		2			
2005					
2006			2		
2007					
2008					1
2009					
2010					
2011					
2012		1			
TOTAL	2	6	2	1	2
<i>D. coriacea</i> mortality/yr	0.09	0.26	0.09	0.04	0.09