

Pathology of finfish and mud crabs *Scylla serrata* during a mortality event associated with a harbour development project in Port Curtis, Australia

M. M. Dennis, B. K. Diggles, R. Faulder, L. Olyott, S. B. Pyecroft, G. E. Gilbert, M. Landos*

*Corresponding author: matty.landos@gmail.com

Diseases of Aquatic Organisms 121: 173–188 (2016)

Table S1. Compiled reports of aquatic animal illness in Gladstone Harbour from February 2011 to October 2012.

Date	Species affected	Observations	Location	Source
2/9/2011	Multi-species fish	Washed up/floating dead	Gladstone marina	Gladstone Observer
4/10/2011	Green Turtles (<i>Chelonia mydas</i>)(10)	Washed up dead	Boyne Island beach	Gladstone Observer
14/04/2011*	Green Turtles (<i>Chelonia mydas</i>) (~8) during week of 11-17 April 2011	Dead	Gladstone Harbour	Commercial fishermen (image) and Gladstone Observer
4/24/2011	Green Turtles (<i>Chelonia mydas</i>) (~4) during week of 18-25 April 2011	Dead	Boyne Island beach	Gladstone Observer
2/05/2011*	Inshore dolphin (<i>Sousa chinensis</i> **)(1)	Dead	Gladstone Harbour	Gladstone Observer
5/9/2011	Inshore dolphin (<i>Sousa chinensis</i> **)(1)	Dead	Boyne Island, Gladstone Harbour	Gladstone Observer
5/15/2011	Inshore dolphin (<i>Sousa chinensis</i> **), two more washed up between this date and late August	Dead	Turtle Beach, Gladstone Harbour	Clive Last and NPWS, Gladstone Observer
5/23/2011	Multi-species: shark (F. Carcharhinidae), cobia (<i>Rachycentron canadum</i>), spanish mackerel (<i>Scomberomorus commerson</i>)	Increased mucus from skin, red skin	Caught adjacent ocean dredge disposal site	Commercial fishermen (image)
6/1/2011	Turtle (<i>Chelonia mydas</i>)(1)	Dead	Boyne River Mouth	Commercial fishermen
6/6/2011	Dugong (<i>Dugong dugon</i>)(1)	Dead	Gladstone Harbour	Gladstone Observer
6/10/2011	Dugong (<i>Dugong dugon</i>)(1)	Dead	7 Mile Inlet near Turkey Beach	Gladstone Observer
6/21/2011	Mud crab (<i>Scylla serrata</i>)(numerous)	Ulcerative shell lesions and rust spots	Colosseum Inlet	Commercial fishermen (image)
6/22/2011	Silver Bream (<i>Acanthopagrus australis</i>)	Ulcerative red skin lesions	Gladstone Harbour	Commercial fishermen
22/06/2011*	Dugong (<i>Dugong dugon</i>)(1)	Dead washed up	Calliope River, near NRG Power Station	Gladstone Observer
6/27/2011	Turtle (<i>Chelonia mydas</i>)(1)	Dead	Boyne River	Commercial fishermen
7/6/2011	Mud crab (<i>Scylla serrata</i>)	Ulcerative shell lesions	Gladstone Harbour north of dredging	Commercial fishermen
7/8/2011	Moribund turtles (<i>Chelonia mydas</i>) (3)	Euthanased due to emaciation and poor health by ENTOX	Boyne River Mouth	Caroline Gaus, Entox
7/11/2011	Flat salmon (<i>Eleutheronema</i> spp.)	Ulcerative skin lesions	Gladstone Harbour	Commercial fishermen
7/12/2011	Mud crab (<i>Scylla serrata</i>) (numerous)	Ulcerative shell lesions	The Narrows	Commercial fishermen
7/12/2011	Coral trout (<i>Plectropomus leopardus</i>)(held in live well of live fish exporter)	Fish kill- red skin	Gladstone marina	Commercial fisherman
7/18/2011	Mud crab (<i>Scylla serrata</i>)(numerous)	Ulcerative shell lesions and rust spots	Grahams Creek	Commercial fishermen

Date	Species affected	Observations	Location	Source
7/21/2011	Estuary cod (<i>Epinephelus coioides</i>)	Ulcerative skin lesions	Grahams Creek	Commercial fishermen
7/21/2011	Turtle (<i>Chelonia mydas</i>)	Dead	Boyne River	Commercial fishermen
7/21/2011	Mud crab (<i>Scylla serrata</i>) (numerous)	Ulcerative shell lesions and rust spots	Grahams Creek	Commercial fishermen
7/24/2011	Dugong (<i>Dugong dugon</i>)(1), and 5 more washed up in the subsequent month	Dead washed up	Witt Island, Gladstone Harbour	Clive Last in Gladstone Observer
7/29/2011	Barramundi (<i>Lates calcarifer</i>)	Skin and deep muscle lesion	Boyne River	Commercial fishermen
7/29/2011	Barramundi (<i>Lates calcarifer</i>)	Red skin lesions	China Bay, Gladstone Harbour adjacent dredging	Commercial fishermen
7/30/2011	Stingray (F. Dasyatidae, Rajidae)	Washed up dead	Barney Point	Public report and image
8/20/2011	Multi-species- Small crabs, painted crayfish (<i>Panilurus ornatus</i>), turtles (<i>Chelonia mydas</i>)	Fish kill	Facing Island near to ocean dredge disposal site	Commercial fisherman
8/21/2011	Barramundi (<i>Lates calcarifer</i>)	Blind ruptured corneas red eyes	Calliope R	Recreational fisherman, Gladstone Observer
8/22/2011	Barramundi (<i>Lates calcarifer</i>)	Exophthalmus and erythema	Mouth of Boyne River	Commercial fishermen
8/23/2011	Turtle (<i>Chelonia mydas</i>)	Washed up dead	South Trees Inlet	Flint et al 2014
8/23/2011	Barramundi (<i>Lates calcarifer</i>)	Exophthalmus and erythema	Grahams Creek	Commercial fishermen and Gladstone Observer
8/24/2011	Turtles (<i>Chelonia mydas</i>)- annual total had reached 119 by this date. Previous years were <30 at same date.	Washed up dead	Gladstone Harbour	Gladstone Observer
8/24/2011	Catfish (<i>Arius</i> spp.) (100's)	Fish kill	Boyne River	Commercial fisherman
8/27/2011	Turtles (<i>Chelonia mydas</i>) (4)	Washed up dead	Facing Island near to ocean dredge disposal site	Gladstone Observer
8/28/2011	Barramundi (<i>Lates calcarifer</i>)(4)	Eye and skin lesions	Boyne River	Commercial fishermen sent to Qld Govt Lab
8/28/2011	Barramundi (<i>Lates calcarifer</i>) (2)	Eye and skin lesions	China Bay, Gladstone Harbour adjacent dredging	Commercial fishermen sent to Qld Govt Lab
9/2/2011	Mud crab (<i>Scylla serrata</i>)	Ulcerative shell lesion	Turkey Beach	Commercial fishermen
9/5/2011	Barramundi (<i>Lates calcarifer</i>)	Dead	Gladstone Harbour near Enfield Creek	Commercial fishermen
9/6/2011	Barramundi (<i>Lates calcarifer</i>)	Ulcerated cornea and damaged gills	South Trees Inlet	Commercial fishermen sent to Qld Govt Lab
9/6/2011	Turtles (<i>Chelonia mydas</i>)- annual total was 158 between 01/01/11 and 06/09/11 compared to 36, 29, 29 in years 2010, 2009, 2008 for same period	washed up dead	Gladstone Area	Strandnet Govt database
9/7/2011	Mud crab (<i>Scylla serrata</i>)	Ulcerative shell lesion	QCL Landing (opposite proposed LNG project)	Commercial fishermen
9/7/2011	Barramundi (<i>Lates calcarifer</i>)	Deep ulcerative skin and muscle lesions	Mouth of Calliope River	Commercial fishermen sent to Qld Govt Lab
9/15/2011	White-spotted cod fish (<i>Epinephalus</i> spp.)	Skin lesions	Rat Island, Gladstone Harbour	Commercial fishermen sent to Qld Govt Lab
9/19/2011	Turtle (<i>Chelonia mydas</i>)	Washed up dead	Quoin Island, Gladstone Harbour	Flint et al 2014
9/19/2011	Mud crab (<i>Scylla serrata</i>)	Ulcerative shell lesions	South Trees Inlet	Commercial fishermen sent to Qld Govt Lab
9/19/2011	Banana prawn (<i>Penaeus merguensis</i>)	Erosive carapace lesions	Shipping channel, Gladstone Harbour	Commercial fishermen sent to Qld Govt Lab

Date	Species affected	Observations	Location	Source
9/25/2011	Multi-species kill- mackerel (<i>Scomberomorus commerson</i>), blue salmon (<i>Eleutheronema tetradactylum</i>), barramundi (<i>Lates calcarifer</i>), 3 turtles (<i>Chelonia mydas</i>)	Washed up and floating dead	The Narrows	Commercial fisherman
9/26/2011	Multi-species kill- blue salmon (<i>Eleutheronema tetradactylum</i>), triple tails (<i>Lobotes surinamensis</i>)	Red skin on ventral surface	The Narrows	Commercial fisherman
9/30/2011	Turtle (<i>Chelonia mydas</i>)	Dead	Canoe Point, Tannum Sands, Gladstone	Public report and image
10/12/2011	Multi-species- turtles (<i>Chelonia mydas</i>) and fish in slime slick	Washed up and floating dead	Eastern side of Turkey Beach	Commercial fisherman
1/10/2011*	Bull shark (<i>Carcharhinus leucas</i>)	Red skin	Calliope R	Commercial fisherman
10/1/2011	Bull sharks (<i>Carcharhinus leucas</i>) (2)	Red skin and dermatitis	Gladstone Harbour	Commercial fishermen sent to Qld Govt Lab
10/1/2011	Barramundi (<i>Lates calcarifer</i>)	Eye damage associated with parasites	Calliope R hot water outlet	Fisheries Queensland sent to Qld Govt Lab
10/4/2011	Barramundi (<i>Lates calcarifer</i>)	Red skin, internal parasitism	Witt Island, Gladstone Harbour	Fisheries Queensland sent to Qld Govt Lab
10/4/2011	Barramundi (<i>Lates calcarifer</i>)	Red skin, eye ulceration, internal parasitism	Hamilton Point, Gladstone Harbour adjacent dredging	Fisheries Queensland sent to Qld Govt Lab
10/4/2011	Barramundi (<i>Lates calcarifer</i>)	Red skin, internal parasitism	Tide Island, Gladstone Harbour	Fisheries Queensland sent to Qld Govt Lab
10/4/2011	King salmon (<i>Polydactylus macrochir</i>)	Red skin lesions	South Trees Inlet	Commercial fishermen
10/5/2011	Barramundi (<i>Lates calcarifer</i>)	Red skin lesions, internal parasitism	Hamilton Point, Gladstone Harbour adjacent dredging	Fisheries Queensland sent to Qld Govt Lab
10/5/2011	Barramundi (<i>Lates calcarifer</i>)	Left eye ruptured, right eye opaque, internal parasitism	Calliope R	Fisheries Queensland sent to Qld Govt Lab
10/5/2011	Barramundi (<i>Lates calcarifer</i>)	Corneal damage and internal parasitism	Boyne R	Fisheries Queensland sent to Qld Govt Lab
10/5/2011	Barramundi (<i>Lates calcarifer</i>) (17)	9 with eye lesions due to neobenedenia flukes, 7 with skin lesions	Tide island(1), South Trees Inlet(1), Northside (1), Turkey Beach (2), Calliope R (2), Witt Island (1), Boyne R (6), Hamilton Point (1)	Fisheries Queensland sent to Qld Govt Lab
10/5/2011	Lemon Shark (<i>Negaprion acutidens</i>)	Red skin lesions	Wild Cattle Island	Fisheries Queensland sent to Qld Govt Lab
10/5/2011	Barramundi (<i>Lates calcarifer</i>)	Red skin lesions	Gladstone Harbour	Commercial fishermen
10/5/2011	Scat marine species (<i>Scatophagus</i> spp.)	Skin ulcer and dermatitis	Gladstone Harbour	Fisheries Queensland sent to Qld Govt Lab
10/5/2011	Trevally (<i>Caranx ignobilis</i>)	red fins and skin degeneration	Boyne River bridge	Fisheries Queensland sent to Qld Govt Lab
10/6/2011	Barramundi (<i>Lates calcarifer</i>)	Red ulcerative corneal lesions, exophthalmus and red skin lesions	Boyne River	Commercial fishermen
10/9/2011	Bull sharks (<i>Carcharhinus leucas</i>) (> 6)	Red skin	Hamilton Point, Gladstone Harbour adjacent dredging	Commercial fishermen
10/9/2011	Barramundi (<i>Lates calcarifer</i>) (>6)	Red ulcerative skin lesions	Tide Island	Commercial fishermen
10/9/2011	Barramundi (<i>Lates calcarifer</i>) (>3)	Red skin and fin lesions	Hamilton Island, Gladstone Harbour adjacent dredging	Commercial fishermen
10/9/2011	Whaler shark (<i>Carcharhinus</i> spp.)	Red skin lesions	Hamilton Island, Gladstone Harbour adjacent dredging	Commercial fishermen
10/11/2011	Barramundi (<i>Lates calcarifer</i>)	Ruptured cornea and skin lesions	Gladstone marina	Commercial fishermen
10/11/2011	Blue salmon (<i>Eleutheronema tetradactylum</i>)	Red skin, head and inside mouth	North of Narrows	Commercial fishermen
10/13/2011	Barramundi (<i>Lates calcarifer</i>) (~660kg catch)	Red skin lesions rejected at processor by food safety authority	Gladstone harbour	Gladstone Observer
10/16/2011	Stingray (F. Dasyatidae, Rajidae)	Red skin washed up dead	Barney Point	Gladstone Observer
10/18/2011	Golden trevally (<i>Gnathanodon speciosus</i>)	Severe ulcerative red skin lesions	Turkey Beach	Commercial fishermen

Date	Species affected	Observations	Location	Source
10/22/2011	Barramundi (<i>Lates calcarifer</i>) (14)	Eye and skin lesions	Boyne River	Fisheries Queensland sent to Qld Govt Lab
10/28/2011	Bull shark (<i>Carcharhinus leucas</i>)	Severe ulcerative red skin lesions	Calliope R at bridge	Commercial fishermen
10/30/2011	Sharks (F. Carcharhinidae) (7)	Skin flukes associated with erosive skin lesions	Calliope R	Fisheries Queensland sent to Qld Govt Lab
10/30/2011	Barramundi (<i>Lates calcarifer</i>)	Gill lesion- blood fluke eggs	Calliope R	Fisheries Queensland sent to Qld Govt Lab
10/30/2011	Banana prawn (<i>Penaeus merguensis</i>), Tiger prawn (<i>Penaeus monodon</i>), King prawn (<i>Penaeus plebejus</i>)	parasites in digestive organ and inflammation of ventral thorax	Off Tannum ocean spoil disposal site	Fisheries Queensland sent to Qld Govt Lab
10/30/2011	Saucer scallop (<i>Amusium balloti</i>)	Diseased	Between Ocean Dredge disposal site and scallop replenishment zone	Commercial fishermen
10/30/2011	Flathead (<i>Platycephalus</i> sp.)	red ulcerative skin lesions	Between Ocean Dredge disposal site and scallop replenishment zone	Commercial fishermen
10/30/2011	Sea snake (<i>Hydrophis elegans</i>)	Red skin lesions	Between Ocean Dredge disposal site and scallop replenishment zone	Commercial fishermen
~1/11/11	Shark (F. Carcharhinidae)	Red skin lesions	7 Mile Inlet near Turkey Beach	Commercial fishermen
11/4/2011	Banana prawn (<i>Penaeus merguensis</i>)	Melanised carapace lesions	Gladstone Harbour Shipping Channel	Commercial fishermen
11/4/2011	Small trawl fish	Hypheema and ulcerative skin lesions	Gladstone Harbour Shipping Channel	Commercial fishermen
11/4/2011	Barramundi (<i>Lates calcarifer</i>)	Ulcerative skin lesions and healing eye lesions	Gladstone Harbour	Commercial fishermen
11/4/2011	Shark (F. Carcharhinidae)	Ulcerative red skin lesions	Rodds Bay	Commercial fishermen
5/11/2011*	Whiting (<i>Sillago</i> spp.) and mullet (<i>Mugil</i> spp.)	Ulcerative red skin lesions	Turkey Beach, Rodds Bay	Commercial fishermen
11/7/2011	Sharks (F. Carcharhinidae) (6)	Dermatitis	Rodds Bay	Fisheries Queensland sent to Qld Govt Lab
11/9/2011	Banana prawn (<i>Penaeus merguensis</i>)	Parasites under carapace	Gladstone Harbour	Commercial fishermen
11/14/2011	Puffer fish (<i>Torquigener</i> spp.)	Washed up dead	Tannum's "second beach"	Public report and image
11/14/2011	Multi-species- fish	Fish kill	Ocean side Facing Island	Commercial fisherman & DERM
11/14/2011	Inshore dolphin (<i>Sousa chinensis</i> **)	Dead	Gladstone Harbour	Commercial fishermen
11/15/2011	Turtle (<i>Chelonia mydas</i>)	Dead	Gladstone Harbour	Commercial fishermen
11/25/2011	Stingray (F. Dasyatidae, Rajidae), grinner (<i>Saurida</i> spp.), shark (F. Carcharhinidae)	Red ventral skin lesions, red skin	Between Barney Point and Auckland Creek	Commercial fishermen
11/25/2011	Banana prawn (<i>Penaeus merguensis</i>)	Ulcerative carapace lesions and brown gills	Between Barney Point and Auckland Creek	Commercial fishermen
11/25/2011	Mud crab (<i>Scylla serrata</i>)	Ulcerative shell disease and rust spot	Between Barney Point and Auckland Creek	Commercial fishermen
11/28/2011	Mullet (<i>Mugil</i> spp.)	Red skin lesions	Rodds Bay	Commercial fishermen
12/5/2011	Oystercrackers (<i>Trachinotus blochii</i>)	Red ulcerative pectoral and tail fin lesions	7 Mile Inlet near Turkey Beach	Commercial fishermen
12/6/2011	Shark (F. Carcharhinidae)	Red eye and severe ulcerative dorsal skin lesion associated with parasites	Calliope River	Commercial fishermen
12/8/2011	Mud crab (<i>Scylla serrata</i>) (3)	Severe ulcerative shell disease	Targinnie (The Narrows)	Commercial fishermen
12/8/2011	Mud crab (<i>Scylla serrata</i>)(1)	Sub-cuticular inflammation in absence of bacteria	Calliope R	Fisheries Queensland sent to Qld Govt Lab
12/9/2011	Mud crab (<i>Scylla serrata</i>)	Ulcerative shell disease	Targinnie (The Narrows)	Fisheries Queensland sent to Qld Govt Lab
12/12/2011	Boney bream (<i>Gerres</i> spp.) and king salmon (<i>Polydactylus macrochir</i>)	Red ulcerative skin lesions	Gladstone Harbour	Commercial fishermen
15/12/11*	Mud crabs (<i>Scylla serrata</i>)	Ulcerative shell lesions and severe rust spots	Enfield, Curtis Island adjacent to Tide Island	Commercial fishermen

Date	Species affected	Observations	Location	Source
12/17/2011	Barramundi (<i>Lates calcarifer</i>)	Red ulcerative skin lesions	Tide Island	Commercial fishermen
12/18/2011	Barramundi (<i>Lates calcarifer</i>) (1)	Skin and gill lesions, internal parasitism	Boyne River	Fisheries Queensland sent to Qld Govt Lab
12/18/2011	Black jewfish (<i>Protonibea diacanthus</i>) (1)	Dermatitis	Hamilton Point, Gladstone Harbour adjacent dredging	Fisheries Queensland sent to Qld Govt Lab
12/18/2011	Barramundi (<i>Lates calcarifer</i>)(1)	Skin and gill lesions, internal parasitism	Hamilton Point, Gladstone Harbour adjacent dredging	Fisheries Queensland sent to Qld Govt Lab
12/18/2011	Mud crab (<i>Lates calcarifer</i>)	Ulcerative shell lesions	Gladstone Harbour	Commercial fishermen
1/1/2012	Barramundi (<i>Lates calcarifer</i>) (>100)	Fish kill	Boyne River	Commercial fishermen
1/6/2012	Shovelnose shark (Rhinobatidae)	Severe skin reddening	Gladstone Harbour	Commercial fishermen
1/6/2012	Soapy jewfish (<i>Scaienid</i> spp.)	Enucleated eye and skin reddening	Auckland channel, Gladstone Harbour	Commercial fishermen
1/7/2012	Mud crab (<i>Scylla serrata</i>)	Ulcerative shell lesions	Colosseum Inlet	Commercial fishermen
1/8/2012	Mud crab (<i>Scylla serrata</i>)	Ulcerative shell lesions	Enfield, Curtis Island adjacent to Tide Island	Commercial fishermen
1/20/2012	Hawksbill turtle (<i>Eretmochelys imbricata</i>)	Floating dead emaciated	Hummocky Island, near Colosseum inlet	Commercial fishermen
1/25/2012	Mud crab (<i>Scylla serrata</i>)	Ulcerative shell lesions	Colosseum Inlet	Commercial fishermen
2/2/2012	Barramundi (<i>Lates calcarifer</i>)	Red ulcerative skin lesions	7 Mile Inlet near Turkey Beach	Commercial fishermen
2/2/2012	Shark (F. Carcharhinidae) and forktail catfish (<i>Arius</i> spp.)	Red skin and fin lesions	7 Mile Inlet near Turkey Beach	Commercial fishermen
10/2/12*	Oystercrackers (<i>Trachinotus blochii</i>)	Ulcerative skin, fin and tail lesions	Turkey Beach	Commercial fishermen
2/12/2012	Mud crab (<i>Scylla serrata</i>)	Ulcerative shell lesions	Colosseum Inlet	Commercial fishermen
3/24/2012	Multi-species fish kill and turtle (<i>Chelonia mydas</i>)	Fish kill and dead turtle	Wild cattle creek	Commercial fishermen
4/1/2012	Catfish (<i>Arius</i> spp.) (numerous)	Emaciated, skin lesions, washed up dead	Canoe Point, Tannum Sands, Gladstone	Public report and image
4/2/2012	Catfish (<i>Arius</i> spp.)	Fish kill, some emaciated with ulcerative skin lesions	Boyne River Mouth	Gladstone Observer
1/05/2012*	Multi-species: queenfish (<i>Scomberoides commersonianus</i>), turtles (<i>Chelonia mydas</i>), barramundi (<i>Lates calcarifer</i>)	Fish kill	Seaview Beach and 7 mile beach	Commercial fishermen
5/17/2012	Turtle (<i>Chelonia mydas</i>)	Washed up dead	Canoe Point, Tannum Sands, Gladstone	Public report and image
5/20/2012	Estuary cod (<i>Epinephelus coioides</i>)	Red skin lesions and ulcerative fin lesions	Colosseum Inlet	Commercial fishermen
5/23/2012	Hundreds of fish	Fish kill	near NRG Power Station	Commercial fishermen
6/14/2012	Mud crab (<i>Scylla serrata</i>)	Ulcerative shell lesions	Colosseum Inlet	Commercial fishermen
6/29/2012	Slatey bream (<i>Diagramma pictum</i>) and barramundi (<i>Lates calcarifer</i>)	Red skin lesions and white patches on gill	Gladstone Harbour	Commercial fishermen
6/29/2012	Oysters (<i>Saccostrea</i> sp)	Dead oysters on rocks	Canoe Point and Wild Cattle Creek, Tannum Sands, Gladstone	Public report and image
7/9/2012	Turtle (<i>Chelonia mydas</i>)	Washed up dead	Tannum's "second beach"	Public report and image
7/30/2012	Turtle (<i>Chelonia mydas</i>)	Washed up dead	Canoe Point, Tannum Sands, Gladstone	Public report and image
10/8/12*	Queenfish (<i>Scomberoides commersonianus</i>)	Red ulcerative skin lesions	Hummocky Island, near Colosseum inlet	Commercial fishermen
8/21/2012	Turtle (<i>Chelonia mydas</i>)	Washed up dead	Canoe Point, Tannum Sands, Gladstone	Public report and image
8/27/2012	Blubberlip bream (<i>Plectorhinchus gibbosus</i>) and mullet (<i>Mugil</i> spp.)	Severe ulcerative red skin lesions	7 Mile Inlet near Turkey Beach	Commercial fishermen

*Date approximate

**Dolphins were unable to be definitively classified to the species level, but were likely *Sousa chinensis* based on geographical ranges described by others (Cagnazzi 2013).

LITERATURE CITED

Cagnazzi D (2013) Review of coastal dolphins in central Queensland, particularly Port Curtis and Port Alma regions. Gladstone Port Corporation, Gladstone