



Future Fisheries

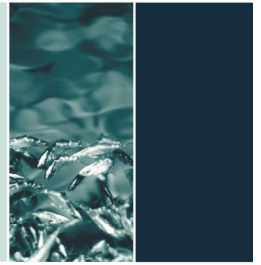
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Project Update 001:

QSIA managed funding which was provided through the charity, Gladstone Fishing Research Fund, to commission FFVS to commence an investigation of the presence and cause of reported aquatic animal health problems in the Gladstone harbour and nearshore waters. Dr Matt Landos and Dr Ben Diggles travelled to Gladstone on 18-25 January, 2012 and undertook intensive sampling of a range of aquatic animals through being onboard with commercial fishers.

Sampling trips were undertaken at:

- Upper Boyne River- sampling barramundi, bull shark, mullet and catfish
- Lower Boyne River- sampling barramundi (not listed on map yet)
- Nearshore Hummocky- sampling barramundi, a turtle, shark
- Offshore near spoil dump site- sampling queenfish and shark
- Friends Point and Grahams creek- sampling mudcrab (not listed on map yet)
- Colosseum- sampling mudcrab and mangrove dieback (not listed on map yet)
- 7 Mile/Turkey beach- sampling whiting, mullet, mudcrab (not listed on map yet)
- 3 harbour trawl shots and 2 spoil ground shots sampling prawn and bycatch



Captured animals were examined for the presence or absence of external lesions such as ulcers on their skin, a tucked up abdomen and damaged gills. Where animals were observed with lesions, 5 typically affected animals were sampled for histological examination, and a range of bacterial culture plates were set up to examine for the presence of bacterial infections.

A second trip is planned to collect control samples from a site remote to the dredging in 3 weeks time. In Gladstone further sampling will focus on scallops and collecting more water quality and algal samples.

I estimate that it will take me at least 1 to 2 months to conduct the necessary scientific testing of samples taken and then prepare my report and conclusions. However, I am able to report some preliminary observations of fish health issues, and also the results of some of the gross pathology examinations I conducted.

Boyerby River, Highway Bridge

I observed a very high prevalence of sick barramundi in the Boyerby River, with the vast majority having tucked up abdomen's indicating an absence of feed in the gut. This was corroborated by necropsy

findings which did not identify ingesta in any of the barramundi sampled. I observed abundant baitfish (mullet) in the river immediately adjacent the locations where barramundi were caught. The mullet were sampled by cast net, and did not exhibit any gross external signs of disease. The barramundi were lethargic, and a high proportion developed a reddening of the scales along the ventral midline which was apparent when fish were removed from the water. Some fish had ulcerative skin and eye lesions, some of which appeared to be healing.

At necropsy, a significant proportion of the sick stock had large volumes of peritoneal effusion, a small dark liver with small spots of pigment on the surface, gross changes to gill with multifocal pale proliferative areas of lamellae, and in many cases an enlarged spleen. Gill tissues from 2 fish were examined under the microscope which identified low numbers of monogenean gill flukes, a suspect myxosporidial cyst and suspect sanguilicolid eggs within lamellae. The cause of the pale colour was not discerned. No ectoparasites were identified either by eye, or under light microscope on the skin of these fish. Samples were collected for histology and microbiology and lesions documented with digital photography.

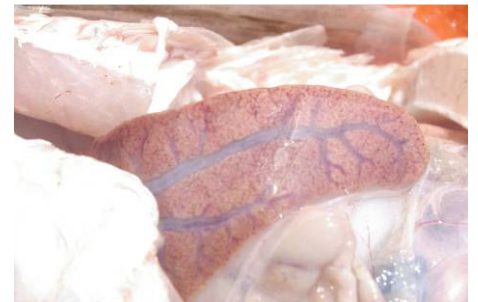
In simple terms, all the barramundi captured were quite sick, regardless of the presence or extent of skin lesions and redness. The vast majority of the captured barramundi, even those with no apparent external skin abnormalities, displayed tucked up abdomens and all were lethargic when handled. I would not recommend human consumption of any of the barramundi which I sampled for histopathology.



Reddening along ventral midline of barramundi



Enlarged spleen barramundi



Abnormal liver barramundi



Peritoneal effusion barramundi



Tucked up abdomen



Healing eye lesion



Healing skin lesion



Active pale white lesion on gill



Fluid within serosa of liver

Several bull sharks were captured in the Boyne River also, all of which had skin lesions associated with parasites (suspect skin fluke). The ventral skin of many of the sharks exhibited erythema (redness) soon after they were removed from the water. The areas affected included areas which were remote from the location of contact with the net in which they were captured.



Ulcerated skin lesion associated with parasites bull shark



Skin lesion adjacent gill and red abdomen bull shark

A large fork tailed catfish exhibited erythema in fins soon after removal from the water. Another smaller fork tail catfish was observed to be emaciated. No internal lesions were identified. Samples were collected for histology and microbiology. The emaciated fish had ingesta present in its gastrointestinal tract, suggesting the fish was sick rather than starving.



Reddened fins, sclera of the eye & rostrum of catfish

The salinity at the Boyne boat ramp close to the river mouth was 31 ppt on 22 January 2012. We then travelled up the river around 14 kilometres where the nets were set adjacent to the highway bridge. The salinity at that location was 31 ppt, indicating near sea level concentrations of salt at the surface with higher salt concentrations registered at greater depths. A further test on 21 January 2012 in the upper

Boyne, around 2 kilometres upstream of the Boyne railway bridge was 30 ppt, indicating slightly brackish water.

Hummocky, near Turkey Beach

Samples were captured using gill mesh netting at this location to the south of Gladstone harbour. Two black tip sharks had skin erosions between their dorsal fins associated with suspected skin fluke parasites. Two barramundi were examined which appeared normal from a visual inspection. Eight other sharks were examined and appeared to be externally normal. A 35cm green turtle was examined which had a peritoneal effusions and pericardial effusion. The turtle was emaciated but had ingesta in its intestines, indicating that it had been eating. Tissues were collected for pathology.

The salinity at Hummocky on 20 January 2012 was 36 ppt, a full marine sea water concentration and indicative of an absence of fresh water influence.



Emaciated Turtle with food still in its intestine

Dredge Spoil Dump Site: east of Gladstone harbour entrance

Pelagic fish and sharks were sampled near to the dredge spoil dumping ground. Dredge spoil dumping from a barge was observed nearby during the fish sampling process. A population of 27 queenfish were sampled. All had infestations of a caligid-like organism on the skin around the pectoral/pelvic area. High numbers, 18 in total, also displayed areas of erythema (redness).



Queenfish skin lesions caught on shot near spoil grounds



Queenfish red skin lesion with parasites visible

A weasel shark was recorded with red lesions on its skin soon after removal from the water. Some suspected copepods were attached to the skin of other sampled sharks. Fish were sampled for histopathology and digital images collected of lesions.



Copepods attached to Shark skin adjacent fin - Shark skin lesion present in addition to skin flukes



Shark skin lesion



Shark copepods

The salinity at this location on 20 January 2012 was 36 ppt, a full marine sea water concentration and indicative of an absence of fresh water influence.

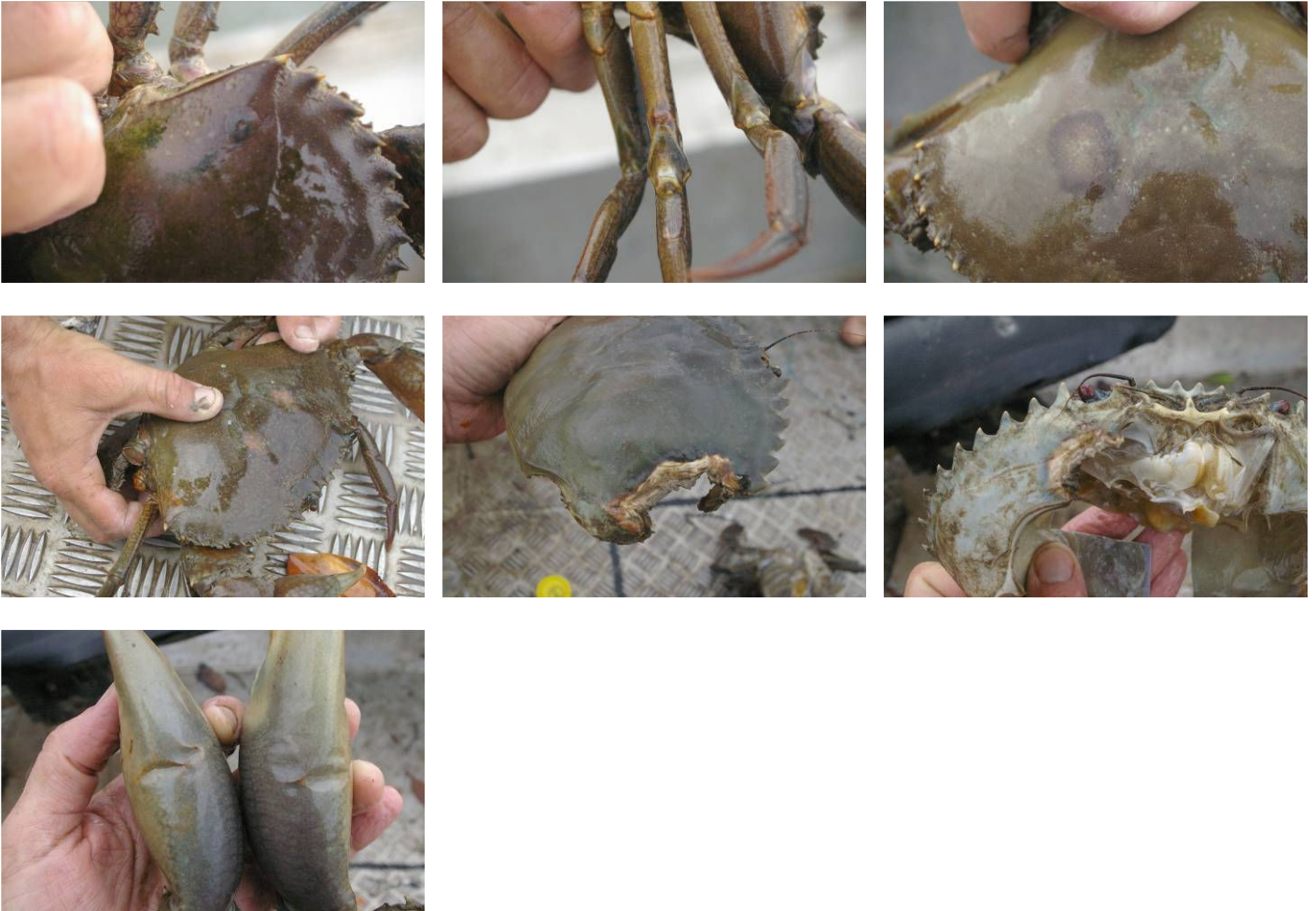
Friends Point, Gladstone inner harbour

At this location mud crabs taken by pot were examined. The mud crabs sampled demonstrated a high incidence of shell disease. 17 of 76 crabs sampled at Friend's Point exhibited mild to severe changes in the shell, ranging from 1-2mm orange coloured spots on the carapace to severe full thickness shell erosions.

Large numbers of suspected barnacles were adherent to the gills of the crabs examined at necropsy. Samples were collected for histological analysis, and digital photographs of all crab lesions recorded.

Only one small cod was captured in the pots which were examined. The absence of small fish in crab pots is unusual.

The salinity at this location on 23 January 2012 was 36 ppt, indicating near full strength sea water with no fresh water influence.



Carapace and exoskeleton lesions of mudcrabs

Shipping Channel, Gladstone inner and outer harbour

3 trawl net shots were undertaken in the harbour. A small amount of prawn and bycatch fish only was captured, and was then examined. The rate of lesions on the examined prawn and small fish was less than 1%.



Pleopods eroded from Banana Prawn taken from Harbour trawl.



Ghost grinner skin lesion (from trawl)



Sole reddening of anterior end of fish

Two trawl shots were then undertaken adjacent the dredge dump site. No scallop shell was captured. Despite the trawl nets being down for approximately 45 minutes, less than 1kg of total catch was able to

be achieved, mostly squid. No benthic fish were able to be captured. I observed that there was very little aquatic biota in the dredge spoil dump site area.

The salinity at this location on 20 January 2012 was 37 ppt on all 5 trawl shots, indicating full strength sea water with no fresh water influence.

Colosseum Inlet, south of Gladstone harbour

Crab catch was examined from 13 pots in the Colosseum. A high incidence of shell disease was observed. 12 of 33 crabs showed signs of lesions on the carapace which ranged in severity from 1-2mm orange discolourations of shell, to full thickness carapace erosions. Digital images of lesions were collected and tissue samples preserved for pathology.



White mangrove die back



Orange rust coloured lesions on mudcrab



Ulcer on claw of mudcrab



Ulcer on claw of mudcrab



Carapace erosion mudcrab



Carapace erosion mudcrab



Carapace erosion mudcrab



Carapace erosion mudcrab



Mangrove die back

I observed that a low quantity of juvenile crabs were present. Only 2 of the 33 were under 14cm carapace width. I also observed that there were few fish found in the pots. Only 2 fish (1 bream and 1 toadfish) were observed in the 13 pots which were pulled.

There are clear signs of mangrove dieback, most obvious in white mangroves, with some dieback also in green mangrove trees in the Colosseum Inlet area.

The salinity at this location on 24 January 2012 was 35.7 ppt, indicating near full strength sea water with very little fresh water influence.

7 Mile, Rodd's Bay /Turkey Beach area, south of Gladstone harbour

Fish species were sampled in this area using net and crab pot apparatus.

Crabs were sampled from 17 pots in the Turkey Beach area of Rodds Bay. 3 of 45 crabs were observed with 1 to 3 mm orange rust spots or ulcer through the carapace.

45 crabs were captured in total, but only 4 were juvenile crabs less than 14 cm in width. 5 small bream and 1 estuary cod were found in total in the 17 pots.

One net shot was undertaken in the Moondoolan area using 2 inch mesh. 1 of 45 sand whiting was observed to have a skin lesion. 5 of 150 mullet were observed to have skin lesions. 2 juvenile queen fish were taken and appeared externally normal. 1 large white shovel nose shark was taken with 20 external parasites, suspect caligid, sampled. Photographs were taken and samples collected for pathology.

The salinity at this location on 25 January 2012 was 28.2 ppt, indicating minor fresh water influence, probably as a result of heavy overnight rain.



Shell ulcer on mudcrab



Red lesion on mullet



Red lesion around vent of mullet



Red lesion on shoulder of mullet



Red lesion around the vent of mullet



Red lesion on flank of whiting

Preliminary Observations

1. In my experience the presentation of this collection of symptoms in wild fish, coincidentally in multiple sites, is unusual. Wild fish generally do not suffer from disease outbreaks in the absence of an environmental trigger, such as a pollution event, or the introduction of an exotic pathogen.
2. The presence of ongoing disease in multiple species suggests the causative factor(s) are still active. The duration of time which has elapsed between the observation of lesions on a range of aquatic biota between 20/01/12 – 25/01/12 by myself and the flood event in late 2010 suggests that other factors are contributing to disease expression today, rather than the flood. The salinity of sampling locations also suggests the freshwater from the flood in late 2010 is no longer present, and is unlikely to be continuing to contribute to the ongoing expression of disease in the aquatic animals.
3. My findings of lesions on a very high percentage of Queenfish out in an ocean area adjacent to the Gladstone dredge spoil dump site would also suggest that the 2010 flood is unlikely to be involved in their causation.
4. Further laboratory sampling will assist in elucidating the role of infectious and environmental stress factors in causation of the abnormalities of fish, crab and prawn tissue in Gladstone waterways.

